DISSERTATION

"ASYMPTOMATIC BACTERIURIA IN WOMEN WITH TYPE 2 DIABETES MELLITUS"

Submitted to

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY
CHENNAI – 600032.

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for the Award of the Degree of

M.D. BRANCH - I

GENERAL MEDICINE

DEPARTMENT OF GENERAL MEDICINE
STANLEY MEDICAL COLLEGE
CHENNAI – 600 001.
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CERTIFICATE BY INSTITUTION

This is to certify that **Dr. P. SANTHOSH CHAKRAVARTHY,** Post - Graduate Student (MAY 2013 TO APRIL 2016) in the Department of General Medicine STANLEY MEDICAL COLLEGE, Chennai- 600 001, has done this dissertation on **"ASYMPTOMATIC BACTERIURIA IN WOMEN WITH TYPE 2 DIABETES MELLITUS"** under my guidance and supervision in partial fulfilment of the regulations laid down by the Tamilnadu Dr. M.G.R. Medical University, Chennai, for M.D. (General Medicine), Degree Examination to be held in April 2016.

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DECLARATION

I **Dr. P. SANTHOSH CHAKRAVARTHY** solemnly declare that I carried out this work on "**ASYMPTOMATIC BACTERIURIA IN WOMEN WITH TYPE 2 DIABETES MELLITUS**" in the Out-patient department of Government Stanley Hospital during the period of February 2015 to August 2015. I also declare that, this bonafide work or a part of this was not submitted by me or any other for any award, degree, or diploma to any other university, board either in India or abroad.

This is submitted to The Tamilnadu Dr. M.G.R. Medical University, Chennai in partial fulfilment of the rules and regulation for the M.D. Branch I, General Medicine Degree examination

Dr. P. SANTHOSH CHAKRAVARTHY

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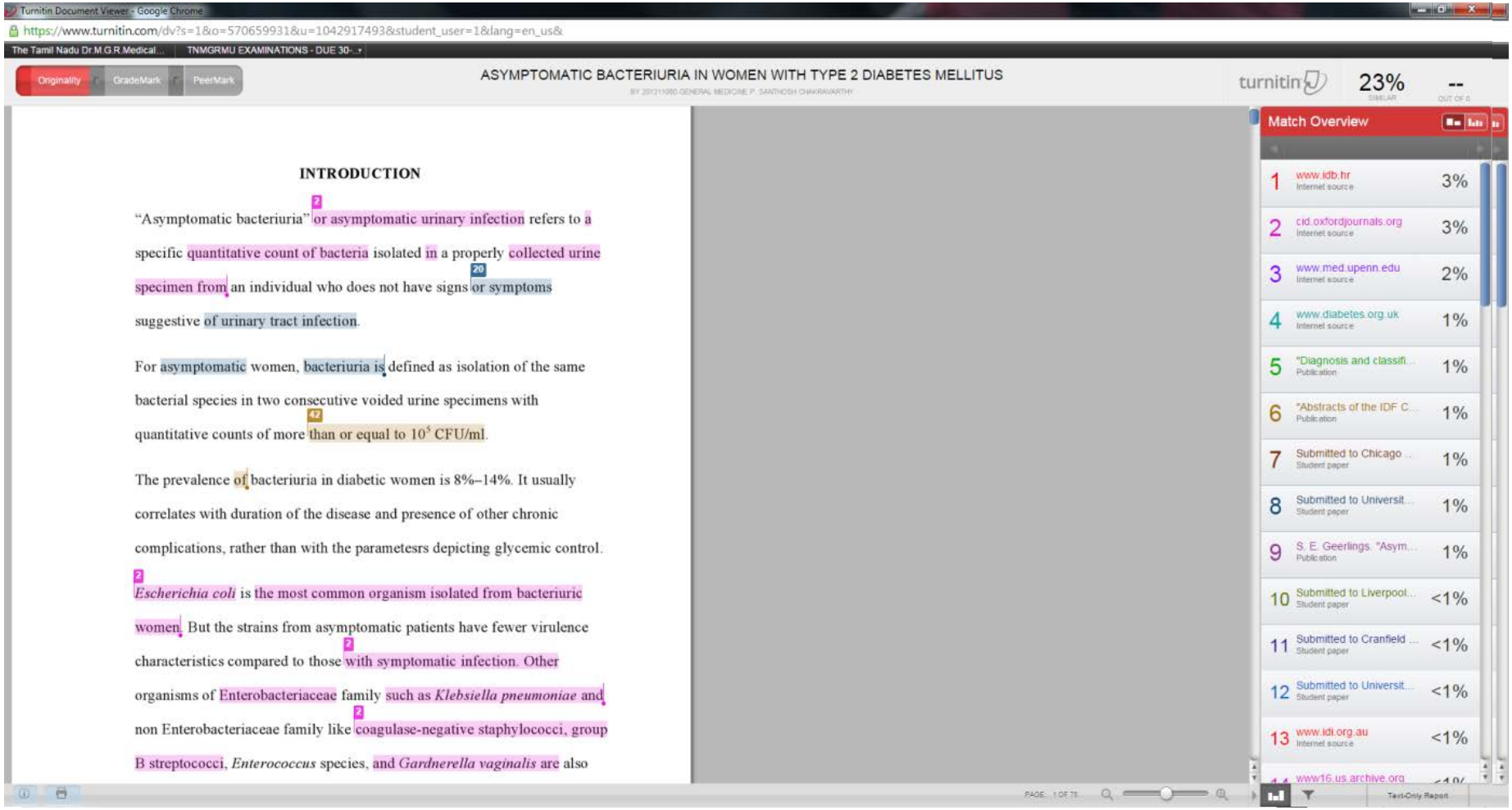
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INTRODUCTION
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For asymptomatic women, bacteriuria is defined as isolation of the same bacterial species in two consecutive voided urine specimens with quantitative counts of more than or equal to 10^5 CFU/ml.
The prevalence of bacteriuria in diabetic women is 8%–14%. It usually correlates with duration of the disease and presence of other chronic complications, rather than with the parametesrs depicting glycemic control.
Escherichia coli is the most common organism isolated from bacteriuric women. But the strains from asymptomatic patients have fewer virulence characteristics compared to those with symptomatic infection. Other organisms of Enterobacteriaceae family such as *Klebsiella pneumoniae* and non Enterobacteriaceae family like coagulase-negative staphylococci, group B streptococci, *Enterococcus* species, and *Gardnerella vaginalis* are also
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Introduction

INTRODUCTION

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Review of Literature

DIABETES MELLITUS

Diabetes is derived from the ancient Greek word for "siphon". A Greek physician noticed that patients with this disease excessively urinated, "siphoning" liquid out of their bodies. The word mellitus is Latin for "honey-sweet" as the patients with diabetes void sweet urine.

DEFINITION

Diabetes mellitus is a group of metabolic disorders characterised by hyperglycaemia. Several types of diabetes mellitus exist which are caused by a complex interaction of genetics and environmental factors. Diabetes mellitus is a collection of metabolic diseases characterized by hyperglycemia due to defects in insulin secretion, insulin action, or both. The biochemical derangements associated with DM causes various pathophysiologic changes in multiple organs that has the propensity to imposes a huge burden on individual and the health care system.[3]

PATHOGENESIS

Diabetes mellitus is a complex metabolic disorder related to multiple genes. Many pathogenic processes are involved in the development of diabetes. These may vary from autoimmune destruction of the beta cells of the pancreas resulting in insulin deficiency to defects that result in resistance to insulin

action. The basis of the abnormalities in carbohydrate, fat, and protein metabolism is deficient action of insulin on the target tissues. Deficient action of insulin results from diminished insulin secretion and/or decreased tissue responses to insulin at one or more points in the pathways of hormone action. Decrease in insulin secretion and defects in insulin action commonly coexist in the same patient, and it is often not clear which abnormality is the primary cause of the hyperglycemia.

TYPES

Diabetes Mellitus is classified based on the primary process that leads to elevated levels of blood glucose. Earlier criteria which used age of onset or type of therapy are not in use nowadays. The two major categories of Diabetes Mellitus are designated type 1 and type 2. Both these types of diabetes are preceded by a phase of abnormal glucose homeostasis. Type 1 Diabetes Mellitus is associated with total or near-total insulin deficiency. Type 2 Diabetes Mellitus is characterized by varying degrees of peripheral insulin resistance, impaired insulin production and elevated glucose levels. Several genetic and metabolic abnormalities in insulin secretion and action lead to hyperglycemia in type 2 DM. This has important therapeutic implications as specific pharmacologic agents are available to target specific derangements in glucose metabolism. Type 2 Diabetes Mellitus is preceded by a significant period of abnormal glucose balance which is referred to as impaired fasting glucose (IFG) or impaired glucose tolerance (IGT).

I.Type 1 diabetes (destruction of beta cells)

A. Immune-mediated

B. Idiopathic

II. Type 2 diabetes

III. Other specific types of diabetes

A. Genetic defects causing dysfunction of beta cells:

1. Hepatocyte nuclear transcription factor (HNF) 4 (MODY 1)

2. Glucokinase (MODY 2)

3. HNF-1 (MODY 3)

4. Insulin promoter factor-1 (MODY 4)

5. HNF-1 (MODY 5)

6. Neuro D1 (MODY 6)

7. Mitochondrial DNA

8. Subunits of ATP-sensitive potassium channel

9. Pro-insulin or insulin

B. Genetic defects in insulin action

1. Insulin resistance Type A

2. Leprechaunism

3. Lipodystrophy syndromes

4. Rabson-Mendenhall syndrome

C. Diseases of the pancreas

Pancreatitis, pancreatectomy, neoplasia, fibrocalculous pancreatopathy, mutations in carboxyl ester lipase, cystic fibrosis, hemochromatosis.

D. Endocrinopathies

Cushing's syndrome, acromegaly, pheochromocytoma, hyperthyroidism, glucagonoma, somatostatinoma, aldosteronoma

E. Drug- or chemical-induced

Glucocorticoids, nicotinic acid, pentamidine, thiazides, diazoxide, -adrenergic agonists, antipsychotics, hydantoins, protease inhibitors, asparaginase, vacor (a rodenticide), epinephrine

F. Infections

Congenital rubella, coxsackievirus, cytomegalovirus

G. Immune-mediated diabetes— "stiff-person" syndrome,

H. Other genetic syndromes sometimes associated with diabetes— Wolfram's syndrome, porphyria, Klinefelter's syndrome, Down's syndrome, Laurence-Moon-Biedl syndrome, Turner's syndrome, Friedreich's ataxia, Prader-Willi syndrome, Huntington's chorea, myotonic dystrophy,

IV. Gestational diabetes mellitus (GDM)

EPIDEMIOLOGY

The worldwide burden of Diabetes Mellitus has raised significantly over the past two decades from appropriately 30 million cases in 1985 to 177 million cases in 2000. Based on these current trends more than 360 million people will have diabetes mellitus by the year 2030. The prevalence of type 2 Diabetes Mellitus is increasing rapidly because of increasing incidence of obesity and reduced activity levels of physical activity as countries become more and more industrialised. Diabetes has rapidly attained epidemiological proportions in India. Presently India has 32 million individuals with diabetes and with the rising trend it is estimated that by 2030 AD, India shall have 80 million people with diabetes, the maximum in any one country.

DIAGNOSIS

If a physician makes a diagnosis of diabetes mellitus he must make sure that the diagnosis is completely established as the consequences for the individual are lifelong and considerable. For a person presenting with severe symptoms and grossly elevated blood glucose, the requirements for confirmation of diagnosis, differ from those for the asymptomatic person with blood glucose values just above the cut–off value. Elevation of blood sugar detected under conditions of acute infective, circulatory, traumatic or other stress may be transient and should not be considered as diagnostic of diabetes mellitus. The diagnosis of diabetes mellitus in an asymptomatic individual should not be made based on a single elevated blood glucose value. For the asymptomatic person, at least one extra plasma/blood glucose test result with a value in the diabetic range is needed to make a diagnosis of DM. It can be either a fasting blood sample, from a random (casual) sample, or from the oral glucose tolerance test (OGTT). If such samples do not confirm the diagnosis of diabetes mellitus, it is advisable to monitor the individual with periodic re–testing till the diagnosis is established. In these circumstances, the physician should take into consideration such additional factors like family history, ethnicity, adiposity, age and concomitant disorders, before making diagnostic or therapeutic decisions.

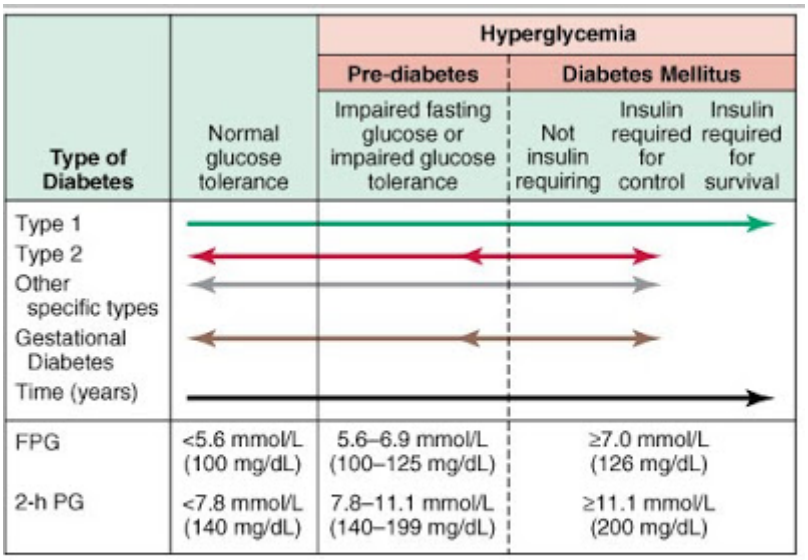
An effective alternative to blood glucose estimation or the oral glucose tolerance test has long been searched for to simplify the diagnosis of diabetes.

Glycated haemoglobin, which reflects the average glycaemia over a period of weeks, was considered such a test. In certain cases it gives almost equal sensitivity and specificity to blood glucose measurement but its availability in many parts of the world is a problem and is not properly standardized for its use to be routinely recommended throughout the world.

Diabetes mellitus in children commonly presents with very severe symptoms and is associated with high levels of blood glucose and significant excretion of glucose and ketones in the urine. In majority of the children, diabetes mellitus can be diagnosed without delay by blood glucose measurements, and treatment can be started immediately, which is often life–saving. An oral glucose tolerance test is not necessary for diagnosis in these circumstances. A small proportion of these children and adolescents may present with lesser symptoms and usually require measurement of fasting blood glucose and an OGTT for diagnosis.

DIAGNOSTIC CRITERIA

Diabetes mellitus is often suspected in individuals with increased thirst and urine volume, unexplained loss of weight, recurrent infections, drowsiness and even coma, in severe cases; high level of glucose is usually excreted in the urine. Single blood glucose values more than the diagnostic value can establish the diagnosis in these cases. For practical purposes, an Oral Glucose Tolerance Test to confirm the diagnosis status should be considered only if random blood glucose levels are in the uncertain range and fasting blood glucose values are below those which are needed to establish the diagnosis of diabetes. If an OGTT is performed, it is enough to measure the blood glucose levels while fasting and at 2 hours after a 75 g oral glucose intake. For children, the load of oral glucose is calculated according to the body weight: 1.75 g per kg. The criteria for diagnosis of diabetes are the same in children and adults.



Source: Fauci AS, Kasper DL, Braunwald E, Hauser SL, Longo DL, Jameson JL, Loscalzo J: *Harrison's Principles of Internal Medicine*, 17th Edition: http://www.accessmedicine.com

Criteria for the Diagnosis of Diabetes Mellitus
Symptoms of diabetes along with random blood glucose level more than 200 mg/dL *or*
Fasting plasma glucose more than 126 mg/dL *or*
A1C >6.5% *or*
Two-hour plasma glucose more than 200 mg/dL during an oral glucose tolerance test

SCREENING

The fasting plasma glucose (FPG) or the Haemoglobin A1C is recommended for type 2 DM screening because

(1) A significant number of persons who meet the existing criteria for diagnosis of Diabetes Mellitus are asymptomatic and not aware about their disorder.

(2) Epidemiological studies point out that type 2 DM may be present in an individual for years before diagnosis is made

(3) Some persons with type 2 DM may have one or more than one complication related to diabetes at the time of their diagnosis

(4) Treatment of type 2 DM may favourably change the course of DM.

The American Diabetes Association recommends routine screening of all individuals above 45 years of age, every 3 years and screening of individuals who are overweight [(BMI) >25 kg/m^2] or have additional risk

factors for diabetes mellitus at an earlier age. In contrast to type 2 DM, a period of asymptomatic presentation with increased blood glucose is rare prior to the diagnosis of type 1 DM. A number of immunologic markers for the diagnosis of type 1 DM are now available, but they are not used routinely.

Risk Factors for Type 2 Diabetes Mellitus
Family history of diabetes mellitus
Obesity (BMI more than 25 kg/m^2)
Lack of physical activity
Race/ethnicity (e.g., Afro American, Latino, Asian American)
Previously identified with IFG, IGT, or an A1C of 5.7–6.4%
History of Gestational Diabetes or delivery of baby with >4 kg birth weight
Hypertension (BP more than 140/90 mmHg)
HDL cholesterol level <35 mg/dL and/or a TG level >250 mg/dL
Polycystic ovarian syndrome or evidence of insulin resistance like acanthosis nigricans
History of cardiovascular disease

ACUTE COMPLICATIONS

Diabetic ketoacidosis (DKA) and hyperglycemic hyperosmolar state (HHS), previously referred to as Hyperosmolar Non-Ketotic Coma (HONKC), are the acute complications of diabetes mellitus. DKA was previously considered an important aid to the diagnosis of type 1 Diabetes Mellitus. But it is also known to occur in individuals who do not have the hallmark immunologic features of type 1 DM and who can sometimes be treated with oral hypoglycemic agents. HHS is seen in persons with type 2 DM. Both these disorders are associated with insulin deficiency, acid-base abnormalities or volume depletion. Both disorders can lead to potentially serious complications if not diagnosed and treated.

CHRONIC COMPLICATIONS

The chronic complications of Diabetes Mellitus affect different organ systems and are mainly responsible for the mortality and morbidity associated with the disease. Chronic complications of diabetes can be divided into those due to vascular and nonvascular causes.

The vascular complications can be further subdivided into micro vascular (retinopathy, nephropathy and neuropathy) and macro vascular (Coronary Artery Disease, peripheral arterial disease, cerebro vascular disease) complications. Nonvascular complications include gastro paresis, infection and skin lesions. The risk of these complications increases as the duration of diabetes increases.

Ophthalmologic Complications:

Nonproliferative and Proliferative diabetic retinopathy

Renal Complications:

Diabetic nephropathy

Neurological complications:

Cerebrovascular disease

Polyneuropathy / mononeuropathy

Autonomic neuropathy

Cardiovascular complications:

Coronary artery disease

Peripheral vascular disease

Gastrointestinal complications:

Gastroparesis

Altered motility of small- and large-bowel

Genitourinary Dysfunction:

Cystopathy

Sexual dysfunction

Infections

Diabetic individuals develop infections frequently than the normal population. The reasons for this include abnormalities in CMI and phagocytosis associated with elevated blood sugar, as well as decreased blood supply. Hyperglycemia supports the growth of a various organisms (including *Candida* and other fungal species). Most diabetics develop greater frequency and severity of common infections, whereas various rare infections are encountered almost exclusively in the diabetics. Some rare infections associated with DM include invasive otitis externa, rhinocerebral mucormycosis and emphysematous infections of the gall bladder and urinary tract.

The most common site of infection in diabetics is urinary tract. Many of the UTIs may not be associated with symptoms. But the number of symptomatic urinary tract infections which are preceded by asymptomatic bacteriuria is not clearly established.

Factors which increase predisposition to infections in diabetes are

- Impaired neutrophil function
- Impaired monocyte function
- Impaired chemotaxis, adhesion, phagocytosis and destruction of microorganisms
- Immune disorders (decrease in the levels of complement /C4 / and T-helper lymphocytes)

Infections causes poor control of diabetes by

- Increased secretion of hormones that oppose the effect of insulin (glucagon, growth hormone, cortisol, and catecholamines)
- Inhibition of insulin secretion
- Insulin resistance (increased cytokine secretion)

URINARY TRACT INFECTION

Urinary tract infection (UTI) is a common illness associated with pain and discomfort. But it usually responds to appropriate antibiotic therapy. In the era before antibiotics was available, UTI was the cause of significant morbidity. Hippocrates, in his writings about this, said that the illness could last for up to a year before either resolving or progressively deteriorating to involve the renal system. The incidence of bacteriuria in diabetics with good glycaemic control is similar to that of non-diabetics. However, in pregnant patients with diabetes it is considered to be 2-4 times more frequent than in control groups.[4]

The term *Urinary Tract Infection* includes a spectrum of disease from asymptomatic bacteriuria (ABU) on one end to cystitis, prostatitis, and pyelonephritis on the other. It is important to distinguish between asymptomatic spectrums from the other complicated entities as it has major clinical implications. Both Urinary Tract Infection and Asymptomatic Bacteriuria signify the presence of bacteria in the urinary tract along with white blood cells and cytokines in the urine. ABU occurs in the absence of symptoms with bacteria in the urinary tract and it usually does not usually require treatment, while UTI implies symptomatic disease that needs antimicrobial therapy. *Recurrent UTI* is does not necessarily mean complicated UTI as individual episodes can be uncomplicated and treated as uncomplicated UTI.

DEFINITIONS[2]

Asymptomatic bacteriuria:

Asymptomatic bacteriuria or asymptomatic urinary infection is defined as the isolation of a specific quantitative count of bacteria in an appropriately collected urine specimen obtained from a person who does not have symptoms or signs which can be attributed to urinary infection.

Pyuria:

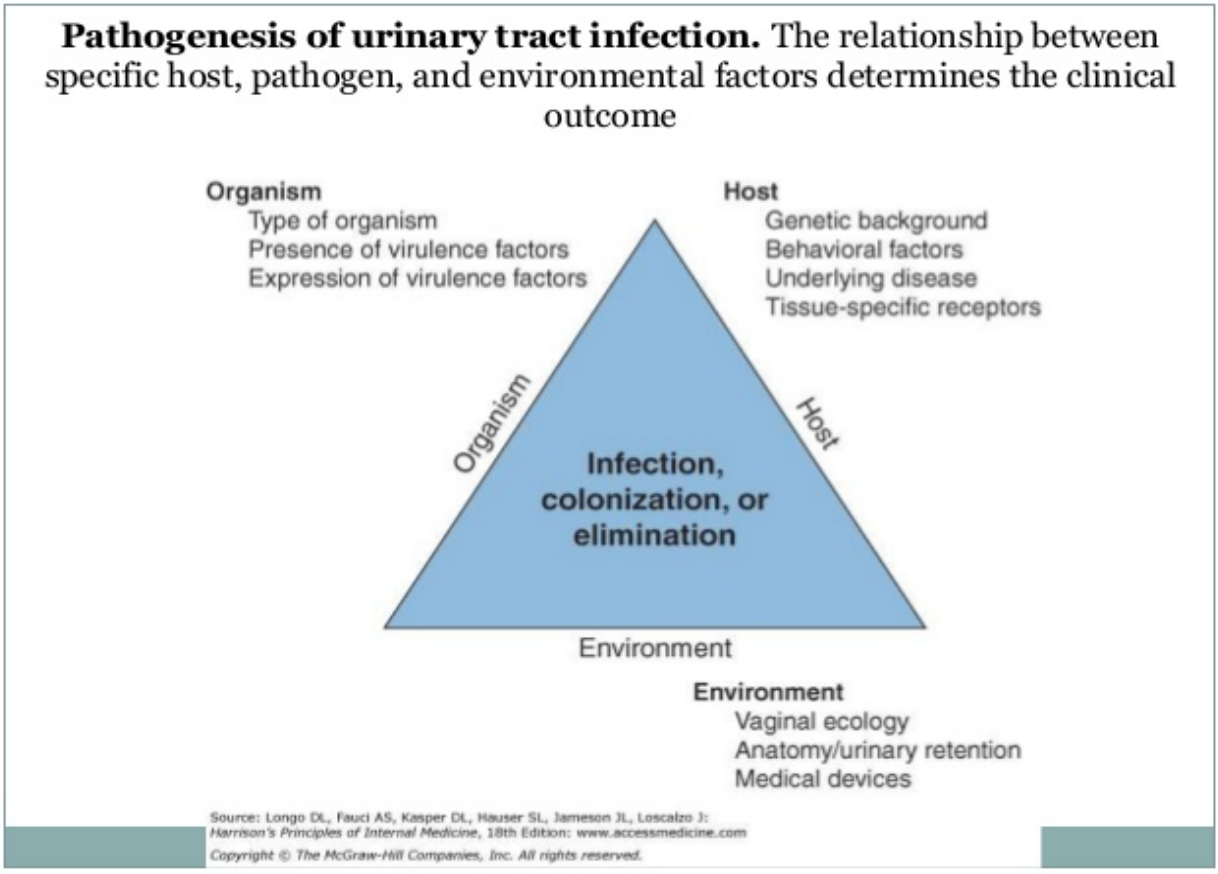
Pyuria is defined as the presence of increased numbers of polymorphonuclear leukocytes in the urine. It is an indication of an inflammatory response in the urinary tract[1].

EPIDEMIOLOGY AND RISK FACTORS

UTI is far more commonly encountered in females than in males. In the neonatal period, the incidence of Urinary tract infection is a little more among males than among females as male infants more frequently have congenital anomalies of the urinary tract. After the age of 50, obstruction due to prostatic hypertrophy (benign/malignant) is commonly encountered in men, and so the incidence of Urinary tract infection in both men and women after the age of 50 becomes almost equal. Between 12 months and ~50 years of age, UTI and recurrent UTI are commonly seen in females.

ETIOPATHOGENESIS

The aetiology of UTI includes migration of organisms from distant foci in the body, from nearby sources through bloodstream or lymph channels, or via orifices in the urinary tract; obstruction of the urinary tract by calculi or other abnormalities in the urinary bladder due to autonomic neuropathy or after urethral catheterization; residual urine in the bladder is a favourable medium for the growth of microorganisms. The pathogens causing urinary tract infection vary by clinical syndrome but are generally enteric gram-negative bacilli.



CLASSIFICATION

A. Infections of upper urinary tract

• Acute pyelonephritis

• Chronic pyelonephritis

B. Infections of lower urinary tract

• Cystitis

• Urethritis

Bacterial infections	**Fungal infections**	**Viral infections**
Cystitis Invasive candidiasis * pyelonephritis Emphysematous cystitis * Pyelonephritis Emphysematous pyelonephritis* Perinephric abscess Papillary necrosis	Vulvovaginal candidiasis* Renal actinomycosis	Cystitis*

* Significantly associated with diabetes mellitus

MICROBIOLOGY

Bacteria

The most common bacteria causing UTI is the gram-negative bacilli, *Escherichia coli.* It is responsible for approximately 90% of acute urinary tract infection in patients with diabetes without any urologic abnormality or urinary tract calculi. The other commonly implicated bacilli include *Proteus, Klebsiella, Serratia, Enterobacter,* and *Pseudomonas*. The *Proteus s*pecies produce urea and *Klebsiella* species produce extracellular slime and polysaccharides. These predispose to stone formation .[4]

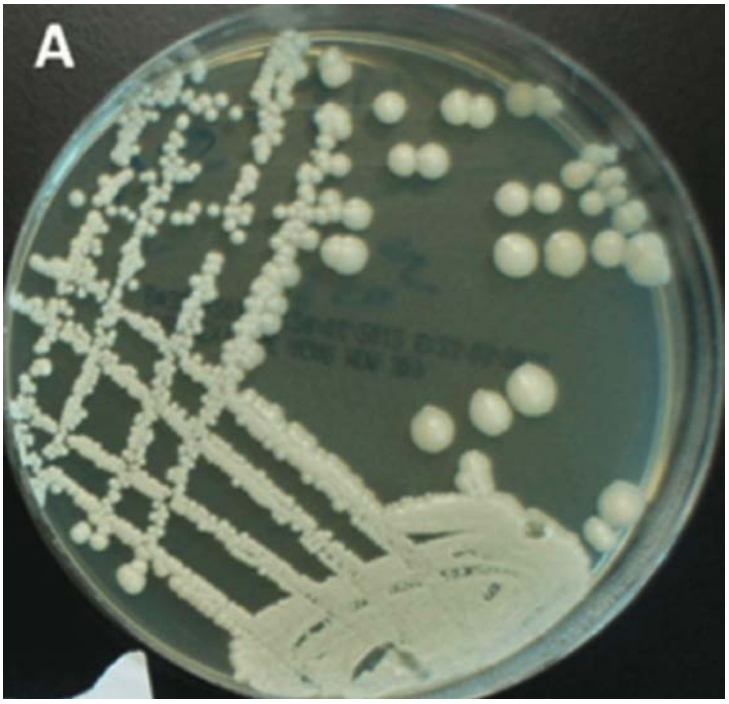
Gram-positive cocci have a lesser important role in UTI. Enterococci and *Staphylococcus aureus* cause infection of the kidneys followed by renal damage. A saprophytic coagulase negative staphlycoccus (CONS) is also considered as an important cause of acute symptomatic urinary tract infection in young diabetic females. *Chlamydia trachomatis* may also be an etiological agent in UTI.

Viruses

Viruses have been considered as an important cause of pyelonephritits and may enhance the susceptibility of the kidneys to co-infection with bacteria. Adenoviruses have been implicated in cystitis.[4]

Fungi

Fungal infection of urinary tract is important but clinically not significant. *Candida glabrata* infection accounts for 20-90% of all urinary tract infections with Candida species. Torulopsis globrata has been implicated in cystitis, pyelonephritis, fungus ball, renal or perirenal abscess, and in gram-negative sepsis. The presence of more than ten thousand colonies per ml in urine indicates Candidal infection.[4]



- Colonies are white to cream colored, glabrous, smooth and yeast-like in appearance – Candida albicans.

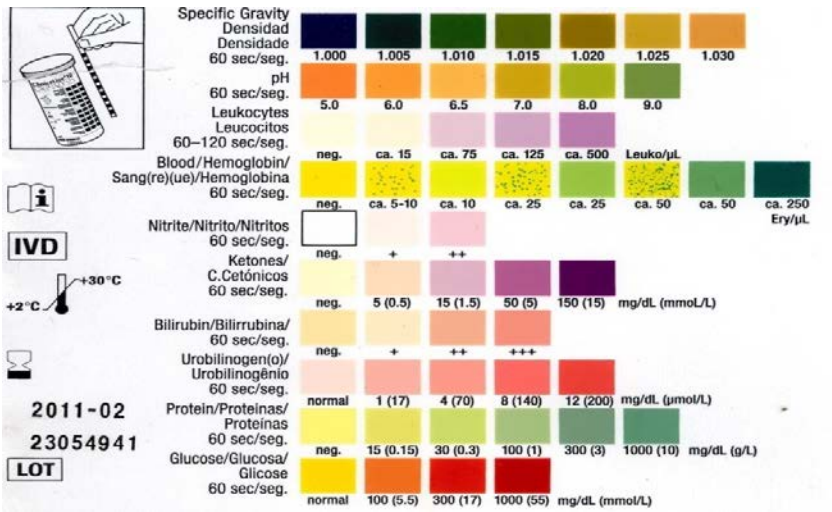
Tuberculosis

UTI and tuberculosis are commonly seen together in patients with diabetes due to the impaired defense mechanisms of the body. Therefore,

tuberculosis should be ruled out in patients having microscopic hematuria before labelling them as diabetic nephropathy.

DIAGNOSTIC TOOLS

The diagnosis of UTI or ABU begins with a detailed history. It has a high predictive value in uncomplicated cystitis. The urine dipstick test and urinalysis are useful diagnostic tools. They provide point of care information. Only bacilli of the family Enterobacteriaceae can convert nitrate to nitrite, and adequate nitrite must be present in the urine if it is to be detected by dipstick test. If a woman with acute cystitis is forcefully consuming liquids and passing urine frequently, the dipstick test for nitrite may become negative, even if *Escherichia coli* is present. The dipstick leukocyte esterase test detects this enzyme in the individual's neutrophils in the urine. Either nitrate to nitrite conversion or leukocyte esterase positivity can be considered as a positive result. UTI may also be suspected when detecting blood in the urine. Urine microscopy reveals presence of pus cells in nearly all cases of cystitis. Red blood cells may also be present.



Detecting the organism in a urine culture is the diagnostic "gold standard" for UTI. The main disadvantage being that, culture results do not become available until 24 hours after the patient's presentation.

BACTERIURIA

Bacteriuria is defined as the presence of bacteria in the urine. Significant bacteriuria is identified by the presence of 10^5 colonies/ml urine or more. When the number ranges from 1000 to 100000 in a clean catch sample, it signifies contamination of the urine sample collecting vessels, or from the periurethral tissues and urethra. The screening procedure for bacteriuria usually requires 2 consecutive positive urine specimens. Significant bacteriuria can be diagnosed regardless of the organism count if the urine is collected directly from urethra or renal pelvis, or by bladder puncture, but are generally avoided as they are invasive procedures.

Causes of bacterial persistence[4]

- Infected renal calculi
- Chronic bacterial prostatitis
- Foreign body
- Vesicovaginal fistulae
- Medullary sponge kidneys
- Vesicointestinal fistulae
- Ectopic ureter draining dysplastic renal segment
- Infected necrotic papillae.

ASYMPTOMATIC BACTERIURIA (ABU)

Asymptomatic bacteriuria can be defined as the isolation of a specific quantitative count of bacteria in a properly collected urine sample from an individual without signs or symptoms which can be attributed to urinary infection, such as dysuria, fever, strangury or flank pain.[1]

- For women who are asymptomatic, bacteriuria can be defined as 2 samples on consecutive days with isolation of the same bacterial species in quantitative counts more than or equal to 10^5 CFU/mL.
- A single bacterial species isolated in a quantitative count more than or equal to 10^5 CFU/mL in a single, clean-catch mid stream voided urine specimen identifies bacteriuria in asymptomatic men.
- A single catheterised urine specimen with one bacterial species isolated in counts more than or equal to 10^2 CFU/mL identifies bacteriuria in men or women.
- Pyuria may accompany asymptomatic bacteriuria.
- Patients who have co morbidities like chronic kidney disease or patients, who are on diuretics, may excrete bacteria in urine with much lower counts in the collected urine specimens, but the criteria for asymptomatic bacteriuria in these selected patients are not standardized.

Pyuria can correlate with inflammation in the urinary tract. It often accompanies asymptomatic bacteriuria in approximately 32% of young women, 70% of women with diabetes and 30 – 70% of pregnant women.

Pyuria may also be present in certain conditions in which no organisms are isolated in urine culture. These conditions include renal tuberculosis, sexually transmitted infections and interstitial nephritis. Thus presence of pyuria alone is not adequate for the diagnosis of asymptomatic bacteriuria.

PREVALENCE OF ASYMPTOMATIC BACTERIURIA

The prevalence of asymptomatic bacteriuria in populations varies widely with sex, age and the presence of various genitourinary abnormalities. It is around 1% in school-going girls and may be up to 20% in healthy women above 80 years of age. An important risk factor for ABU in young females is sexual activity. It is directly proportional to the frequency of sexual activity.

The prevalence of ABU in diabetic women is between 9 to 27% as per various studies, whereas in healthy non-diabetic premenopausal women, it is approximately 1 to 5 %. ABU is considered to correlate with the duration of diabetes mellitus and other long term complications of diabetes mellitus rather than the biochemical parameters of glycemic control. Asymptomatic bacteriuria is very rare in young males. The prevalence of ABU increases in males significantly after the age of sixty, probably due to the obstruction to the urine outflow that can be attributed to the hypertrophy of prostate. There appears no difference in the prevalence of ABU in diabetic and no-diabetic women.

Many patients with chronic disabilities associated with impaired voiding of urine or with indwelling foley's catheter or devices, are at an extremely high risk of asymptomatic bacteriuria. Patients with spinal cord injury have a prevalence of more than 50%, irrespective of how they void. Using an indwelling catheter for prolonged periods or a permanent stent in the ureters is associated with bacteriuria almost 100% of the time.

MICROBIOLOGY OF ABU

Escherichia coli is the most commonly isolated organism in women with bacteriuria. It has been observed in various studies that *Escherichia coli* strains isolated from women with ABU generally have lesser virulence than those from women with symptomatic urinary tract infection.[1] Other Enterobacteriaceae (like *Klebsiella pneumoniae*) and other organisms (including CONS, *Enterococcus* species, *Gardnerella vaginalis and* group B streptococci) may also be commonly present. In men, staphylococci that are coagulase negative are also present along with gram-negative bacilli and *Enterococci.* Individuals with a long-term indwelling catheters or permanent stent in the ureters, usually have polymicrobial bacteriuria. This may include urease-producing organisms, such as *P. mirabilis, Morganella morganii* and *Providencia stuartii and Pseudomonas aeruginosa.*

Escherichia coli

It is a gram negative organism which is facultatively anaerobic. It belongs to the genus Escherichiae. It is commensal of gastrointestinal tract but a small proportion of strains are pathogenic. E. coli can be classified into serotypes based on lipopolysacharide (O), fimbrial (F), capsular (K) and flagellar (H) antigens.

MICROSCOPY

They are Gram negative rod shaped mono flagellated bacilli.

CULTURE

It forms shiny, mucoid colonies with raised margins. Older colonies have a darker center. On MacConkey Agar with Sorbitol it forms pink colonies.

BIOCHEMISTRY

Indole positive, Methyl red positive, citrate negative, oxidase negative, Voges – proskauer negative, produces gas in glucose and acid in lactose.

- Mac conkey agar Culture medium showing pink colonies Escherichia Coli.

Klebsiella pneumoniae

Klebsiella pneumoniae is a facultative anaerobic bacterium also called as Friedlander's bacillus. It is a constituent of the normal flora of the oral cavity, skin, and gastro intestinal tract. *Klebsiella* express two types of antigens on their cell surfaces, LPS O antigen and K antigen, a capsular polysaccharide.

MICROCSOPY

It is a Gram-negative, encapsulated, nonmotile, and rod-shaped bacillus.

CULTURE

Grey, round, shiny and mucoid colonies (2-3 mm in diameter), are formed on agar plates. It does not produce hemolysis on blood agar. It forms mucous, lactose positive colonies on MacConkey agar.

BIOCHEMISTRY

Indole negative, Methyl red negative, urease positive, Voges – proskauer positive, produces gas in glucose and acid in lactose.

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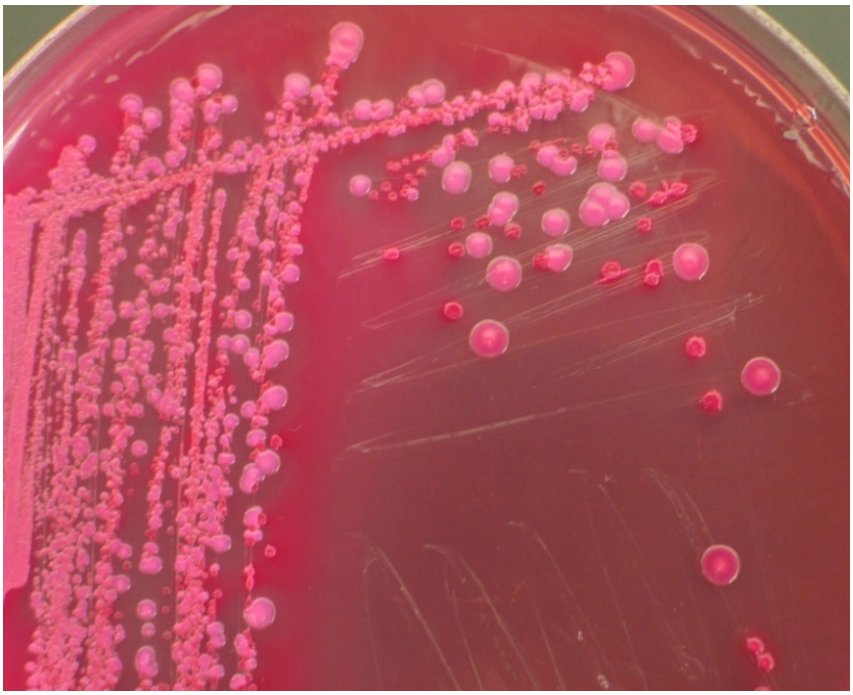


- Mac conkey agar medium with mucoid lactose positive colonies of Klebsiella pneumonia

Pseudomonas aeruginosa

It is also called as Pseudomonas pyocyanea.

MICROSCOPY

It is a gram negative, rod-shaped, non sporing and monoflagellated bacterium

CULTURE

Pseudomonas produces three colony types depending upon the isolates. Rough colonies are produces by soil organisms. Clinical samples yield either one of the two smooth colony types.

First type has a fried-egg appearance with smooth, flat edges and a raised centre. Another type, frequently obtained from urinary tract secretions, has a mucoid appearance, due to the production of alginate slime. They play a role in colonization and virulence. *P. aeruginosa* strains. It produces two types of pigments, pyoverdin and pyocyanin. It is a non lactose fermenter. Some strains produce haemolysis in blood agar.

BIOCHEMISTRY

Catalase, citrate and oxidase positive. Indole, methyl red and Voges – proskauer negative.

- *Pseudomonas aeruginosa* producing mucoid colonies on agar

Proteus mirabilis

The name ‘proteus’ implies the pleomorphic nature of the organism named after the Greek God Proteus who can change into any shape. It is a facultative anaerobic bacterium. It is an important urinary and nosocomial pathogen.

MICROSCOPY

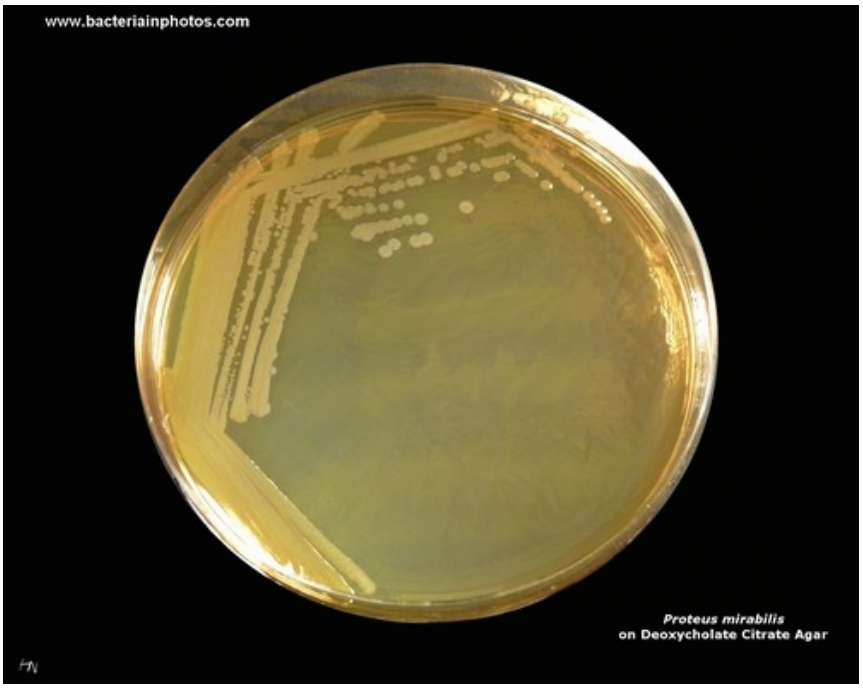
Proteus mirabilis is a Gram-negative, rod-shaped, flagellated bacillus.

CULTURE

Colonies are discrete at first but later forms filmy layer in concentric circles due to motility of organism. It produces a putrefactive fishy odour on agar with characteristic swarming motility. On Mac Conkey agar it forms colourless colonies.

BIOCHEMISTRY

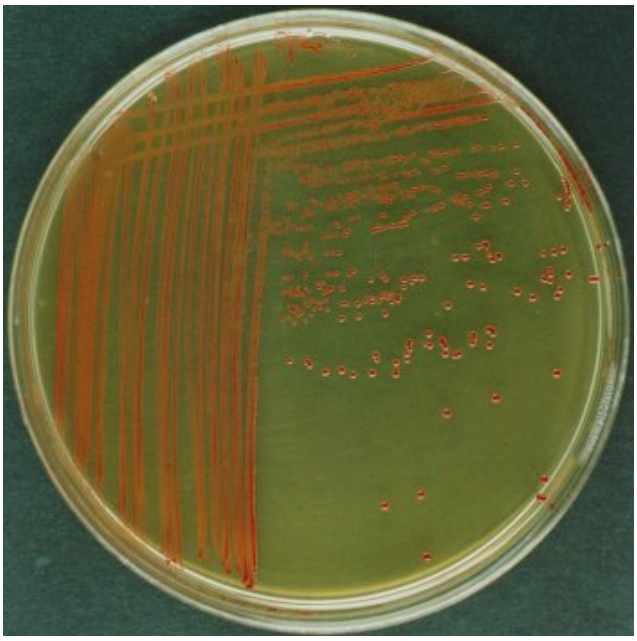
Methyl red and urease positive. Ornithine decarboxylase positive. Voges – proskauer and indole negative.



- Proteus mirabilis on DCA agar

Enterococci

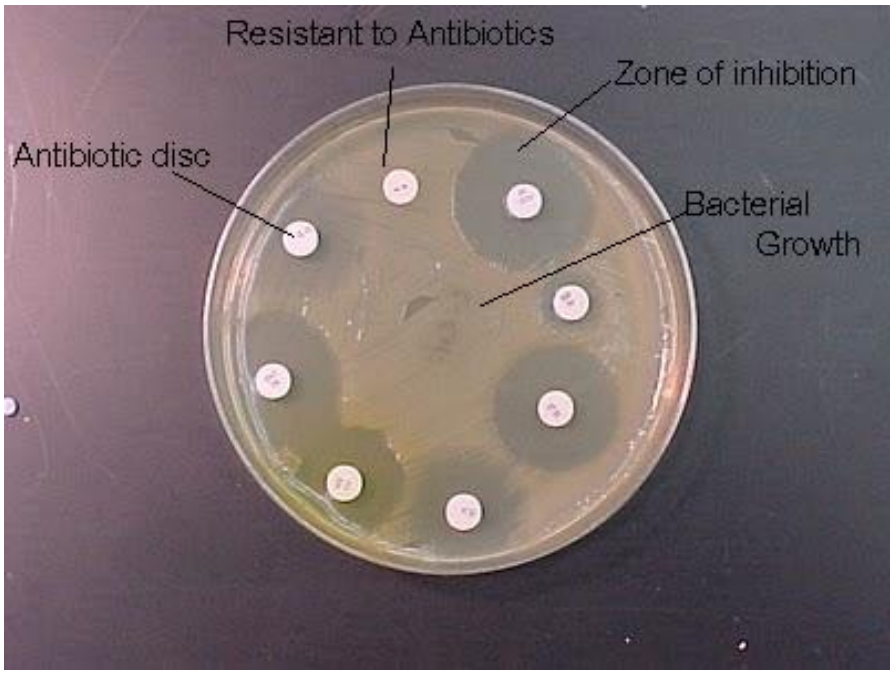
Enterococci are Gram-positive cocci that often occur in pairs (diplococci). These bacteria are facultative anaerobes.



- Enterococcus on agar

DISK DIFFUSION METHOD:

The antibiotic susceptibility testing is done on Agar plate where the bacteria have been placed. Drug disks tested are – cefotaxime, amikacin, gentamycin, ciprofloxacin, norfloxacin and cotrimoxazole. The plates are incubated at 37ºC and examined after 24 hours of incubation. The zones of inhibition are measured in millimeter and the results are interpreted using validated CLSI (Clinical and laboratory standard institute) interpretive breakpoints.



SPECIAL SITUATIONS

1. Premenopausal, Nonpregnant Women

In young women, symptomatic urinary tract infection occurs more frequently in individuals who have had asymptomatic bacteriuria previously. However, asymptomatic bacteriuria is not associated with chronic kidney disease, hypertension or decrease in life span. Also, treatment is not warranted as it is neither associated with any decrease in the frequency of symptomatic infection nor does it prevent further episodes.[1]

2. Pregnant Women

In contrast to non pregnant females, women with asymptomatic bacteriuria in early pregnancy have a 20–30-fold increased risk of developing pyelonephritis. These women also have more risk of complications like premature delivery and low birth weight. Therefore it is imperative to screen pregnant women for bacteriuria by urine culture at least once in early pregnancy. Treatment should be given with sensitive antibiotics at the earliest if found positive.

3. Subjects with Spinal Cord Injuries

Asymptomatic bacteriuria needed not be screened for or treated in spinal cord–injured patients as recurrence is the rule.

4. **Urologic Interventions**

Patients with asymptomatic bacteriuria who undergo traumatic genitourinary procedures associated with mucosal bleeding have a high rate of post-procedure bacteremia and sepsis. Hence screening and treatment of asymptomatic bacteriuria is recommended before such procedures.

5. Diabetic women

Several clinical studies show that bacteriuria is more common among females with diabetes compared to males. Also diabetes mellitus increases the risk of bacteremia in patients with bacteriuria. *Escherichia coli* is the most common causative organism and its principal source is urinary tract. *Klebsiella* spp. is also responsible for bacteriuria and bacteremia. Based on few studies it was found that approximately 19% of women and 2% of men with diabetes have UTI. And 43% have evidence of renal parenchymal diseases, the percentage of which may rise in the absence of treatment. The prevalence of UTI in diabetic nephropathy is around 13%. Recurrence and re infection (recurrence with a different organism or serotype) is also common in diabetics following treatment. The factors that predispose diabetics to repeated infections are ill-understood. Some factors which may contribute to increase the frequency of infection includes,

- Autonomic neuropathy leading to delayed bladder emptying
- Diabetic nephropathy
- Impaired host defence mechanisms.

The duration of diabetes mellitus and the presence of other long term complications may predispose to increased bacteriuria in diabetes. In contrast poor glycemic control and HbA1c levels does not appear to contribute to the increased frequency of UTI according to some studies.[19]

Screening for asymptomatic bacteriuria in diabetic women and its subsequent treatment has long been a subject of significant controversy. While some studies suggest that early treatment of asymptomatic bacteriuria in diabetic women can prevent development of complications such as complicated pyelonephritis, other studies show no difference in the incidence of complicated pyelonephritis in diabetic women with previous asymptomatic bacteriuria and without previous asymptomatic bacteriuria. The Infectious Disease Society of America does not recommend screening and antimicrobial therapy of all diabetic women with asymptomatic bacteriuria. But European studies conclude that all urinary tract infections in diabetic individuals should be treated irrespective of the symptoms due to the significant risk of progression to pyelonephritis.[4]

AIM AND OBJECTIVES

1. TO FIND THE ASSOCIATION OF ASYMPTOMATIC BACTERIURIA WITH TYPE 2 DIABETES MELLITUS IN WOMEN.
2. TO DESCRIBE THE CAUSATIVE ORGANISMS OF ASYMPTOMATIC BACTERIURIA IN DIABETIC WOMEN AND NON DIABETIC WOMEN.
3. TO DETERMINE THE ANTIBIOTIC SUSCEPTIBILITY OF ISOLATED ORGANISMS.

Materials & Methods

MATERIALS AND METHODS

STUDY POPULATION

50 consecutive women with type 2 diabetes mellitus attending Medical OPD with 50 control women**.**

DURATION:

February 2015 to August 2015.

STUDY DESIGN:

Case control study

CASE SELECTION:

1. Female diabetic patients in medical OPD.
2. Age more than 40 years.

EXCLUSION CRITERIA:

1. Patients who have received antibiotics in the last 14 days.
2. Patients who have had a Foley's catheter inserted within 2 month before enrolment of study.
3. Pregnant patients.
4. Patients with gynecological infections
5. Patients with symptomatic urinary tract infection

6. Patients who are taking diuretics.

7. Patients with urinary tract abnormalities.

8. Patients with urinary tract stones**.**

CRITERIA FOR CONTROL:

Age-matched, Non diabetic, healthy women more than 40years of age with fasting blood sugar < 100mg/dl and post-prandial blood sugar<140mg/dl, attending Master Health Checkup OPD in GSH.

METHODOLOGY:

A total of 100 subjects were included in this study. Case group comprised of women above 40 years of age with type 2 diabetes mellitus and control group comprised of age-matched, healthy non diabetic woman above 40 years of age attending Master Health Checkup OPD in Government Stanley Hospital. Informed consent forms were obtained from case group and control group participants.

During initial visit, relevant history was elicited from all participants regarding age, occupation, address, history suggestive of symptomatic urinary tract infection, history of prior hospitalization and history suggestive of gynecological infections. General examination was carried out in all patients.

Fasting and post prandial blood sugar were measured in all participants. Bacteriuria was checked in all participants by urine culture. The urine specimens were collected during the non menstrual period. Bacteriuria was said

to be present only if 2 consecutive voided urine specimens isolate the same bacterial strain in quantitative counts > 10^5 CFU/ml.

If bacteriuria was established, the participants were treated with optimal dose of antibiotics for 5 days according to the urine culture/sensitivity report. 15 days later, the urine culture was repeated to look if the organism has been eradicated from the urinary tract. Ultra sonogram of the abdomen and pelvis was done in all participants to screen for urinary tract abnormalities and urinary tract stones.

STUDY PRINCIPLE

TEST 1: Fasting and postprandial blood sugar

TEST 2: Urine analysis with urine sugar and deposits

TEST 3: Urine culture and isolation of micro organism

TEST 4: Antimicrobial susceptibility testing

TEST 5: Ultra sonogram of abdomen & pelvis

DIAGNOSIS

URINE ROUTINE ANALYSIS

- Urine sugar was graded as nil, trace amounts, 1+, 2+, 3+ and 4+ based on rapid dipstick method.
- Urine protein was graded as nil, trace amounts, 1+, 2+, 3+ and 4+ based on rapid dipstick method.

- Urine deposits were analysed in light microscope and number of pus cells per high power field is noted.

URINE CULTURE

Urine specimen was plated on standard agar and differential media like Mac Conkey agar. Isolation of organism and quantitative analysis of colonies was done.

Colony count:

More than or equal to 10^5 colony forming units per ml was taken as significant growth

Colony characteristics and speciation:

E. coli - shiny, mucoid colonies with raised margins on agar and lactose fermenter in Mac Conkey agar.

K. pneumonia - grey, round, shiny and mucoid colonies (2-3 mm in diameter), are formed on agar plates. Lactose fermenting pink colonies in Mac Conkey agar.

P. mirabilis - discrete colonies followed by a filmy layer in concentric circles with characteristic swarming motility. On Mac Conkey agar it forms colourless colonies.

METHOD OF SAMPLE COLLECTION:

1. Patients were advised to cleanse the urethral area with soap and towel.
2. They were instructed to discard the first portion of the voided urine stream **(**about 10 ml).
3. Patients were advised to collect at least 5-10 ml of voided urine in a sterile leak-proof container by moving into the stream of urine without halting or restarting the stream (Clean catch, mid stream urine specimen)
4. The samples were labelled with name, age, gender and patient number.
5. The samples were processed within 2 hours after collection.

ULTRASONOGRAM OF ABDOMEN AND PELVIS

It was done in all patients to look for the presence of urinary tract stones and urinary tract abnormalities. Patients with such abnormalities were excluded from the study

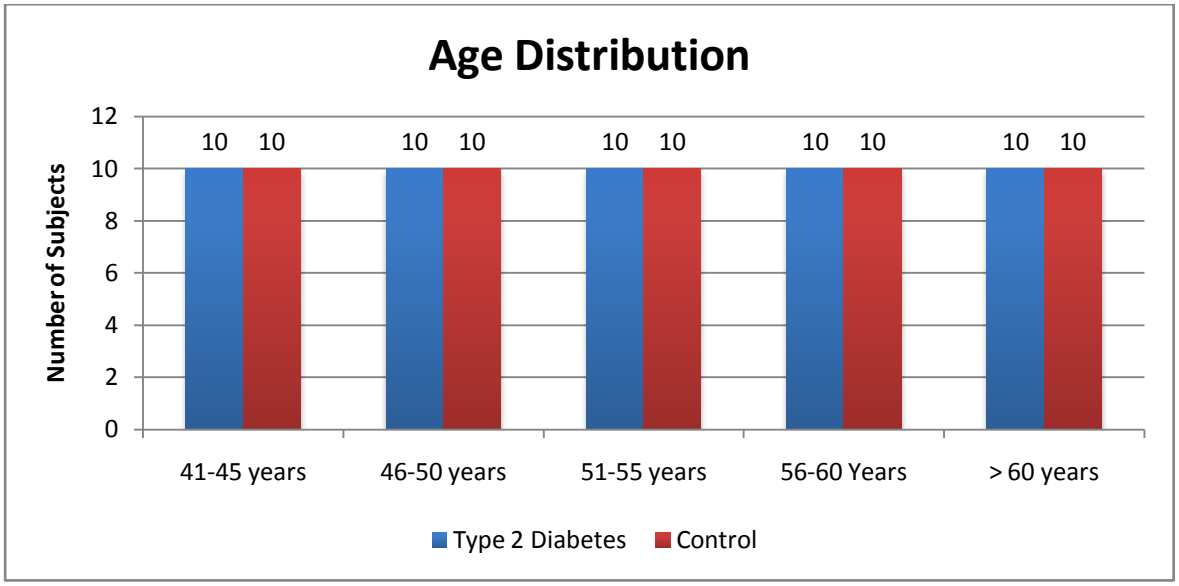
STATISTICS:

Descriptive statistics was done for all data and were reported in terms of mean values and percentages. Suitable statistical tests of comparison were done. Continuous variables were analysed with the unpaired t test. Categorical variables were analysed with the Chi-Square Test and Fisher Exact Test. Statistical significance was taken as $P < 0.05$. The data was analysed using SPSS version 16 and Microsoft Excel 2007.

Observation & Results

OBSERVATION AND RESULTS

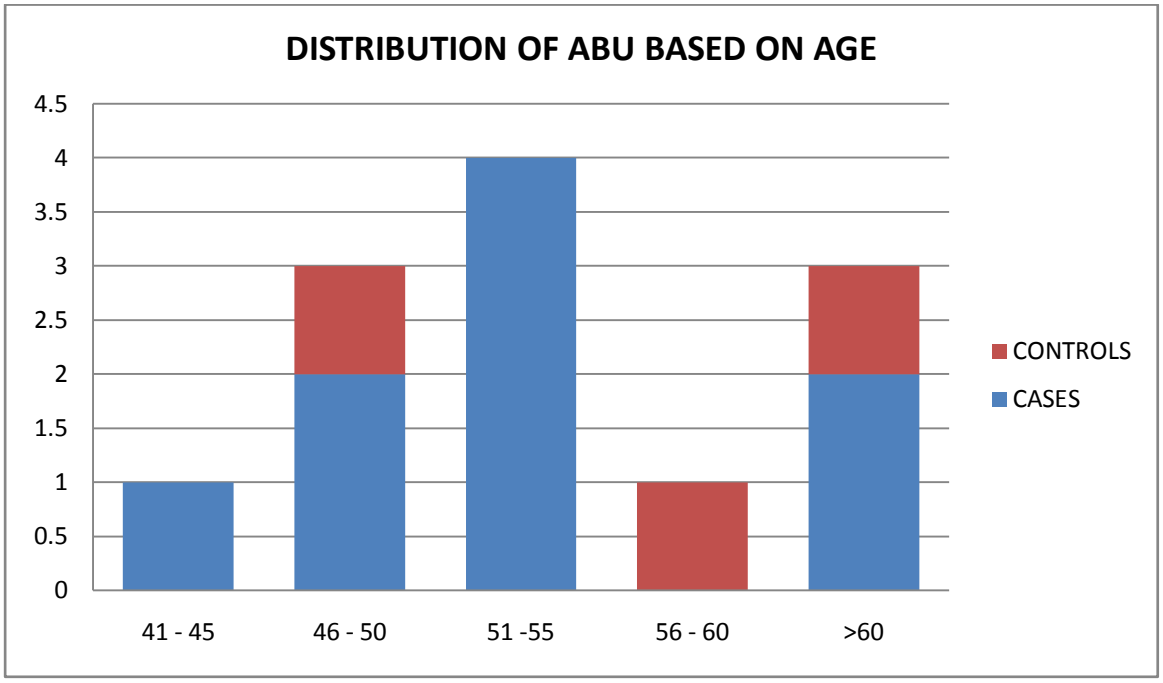
AGE



Age Distribution	Type 2 Diabetes	%	Control	%
41-45 years	10	20.00	10	20.00
46-50 years	10	20.00	10	20.00
51-55 years	10	20.00	10	20.00
56-60 Years	10	20.00	10	20.00
> 60 years	10	20.00	10	20.00
Total	50	100	50	100

Age Distribution	Type 2 Diabetes	Control
N	50	50
Mean	54.14	53.28
SD	8.40	8.05
P value Unpaired t Test		0.6025

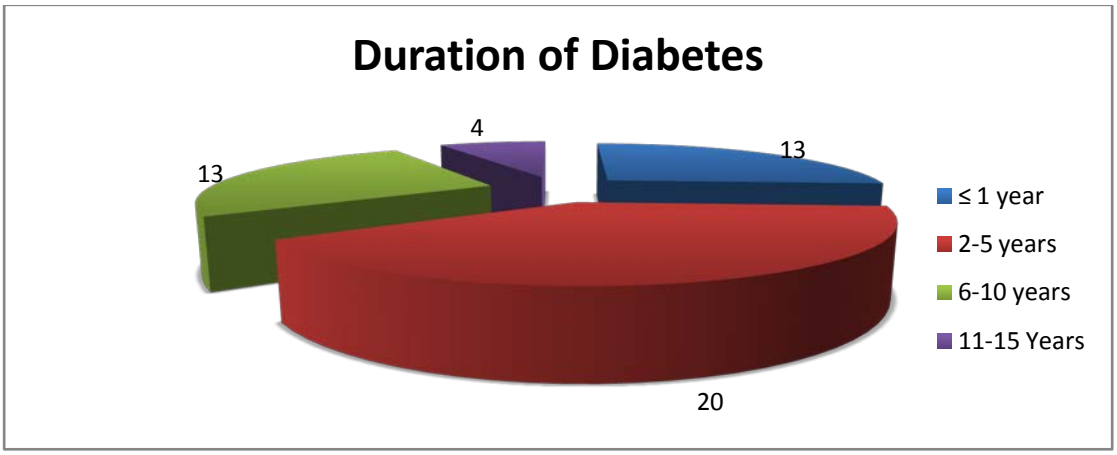
All the diabetic patients belonged equally to all age class interval (n=10, 20%) with a mean age of 54.14 years. In the control group, the same picture was reflected (n=10, 20%) with a mean age of 53.28 years. The association between the intervention groups and age distribution is considered to be not statistically significant since p > 0.05 as per 2 tail unpaired t test.



AGE GROUP	ABU	CASES	CONTROLS
41 - 45	1	1	0
46 - 50	3	2	1
51 -55	4	**4**	0
56 - 60	1	0	1
>60	3	2	1
Total	**12**	**9**	**3**

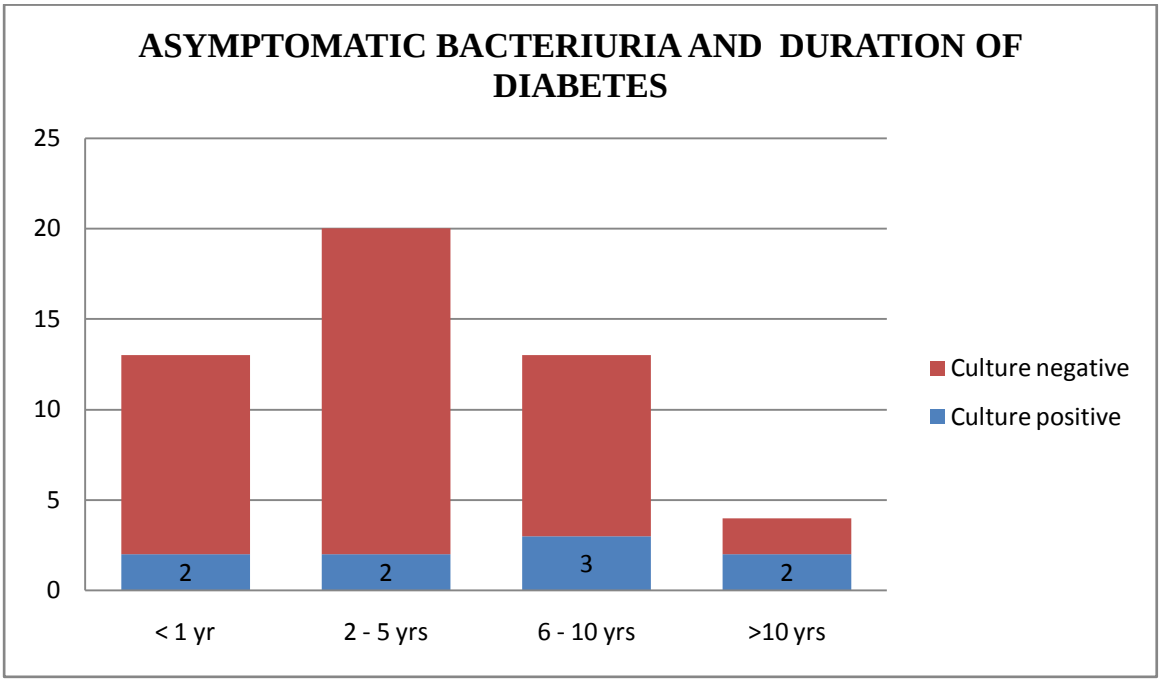
DURATION OF DIABETES

Duration of Diabetes	Type 2 Diabetes	%
≤ 1 year	13	26.00
2-5 years	20	40.00
6-10 years	13	26.00
11-15 Years	4	8.00
Total	50	100



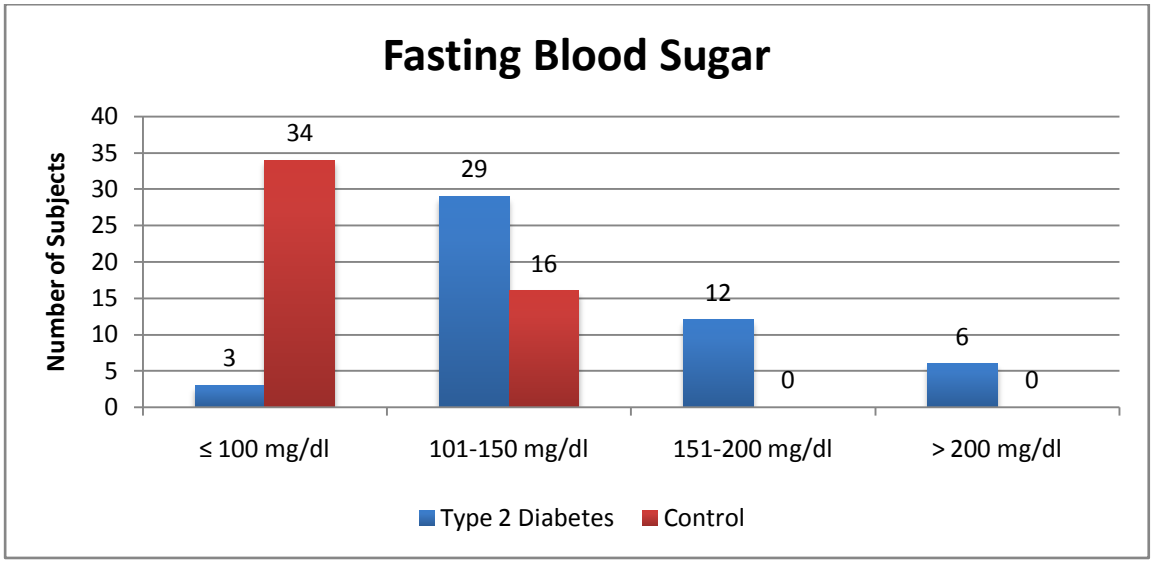
ASYMPTOMATIC BACTERIURIA AND DURATION OF DIABETES

Among patients with diabetes for more than 10 years 50% had asymptomatic bacteriuria compared to 15.4% of those with diabetes for less than one year.



Duration of Diabetes	Total No of Cases	ABU	Percentage
< 1 yr	13	2	15.4%
2 - 5 yrs	20	2	10%
6 - 10 yrs	13	3	23%
>10 yrs	4	2	**50%**
Total	**50**	**9**	

FASTING BLOOD SUGAR



Fasting Blood Sugar	CASES	%	CONTROL	%
≤ 100 mg/dl	3	6.00	34	68.00
101-150 mg/dl	29	58.00	16	32.00
151-200 mg/dl	12	24.00	0	0.00
> 200 mg/dl	6	12.00	0	0.00
Total	50	100	50	100

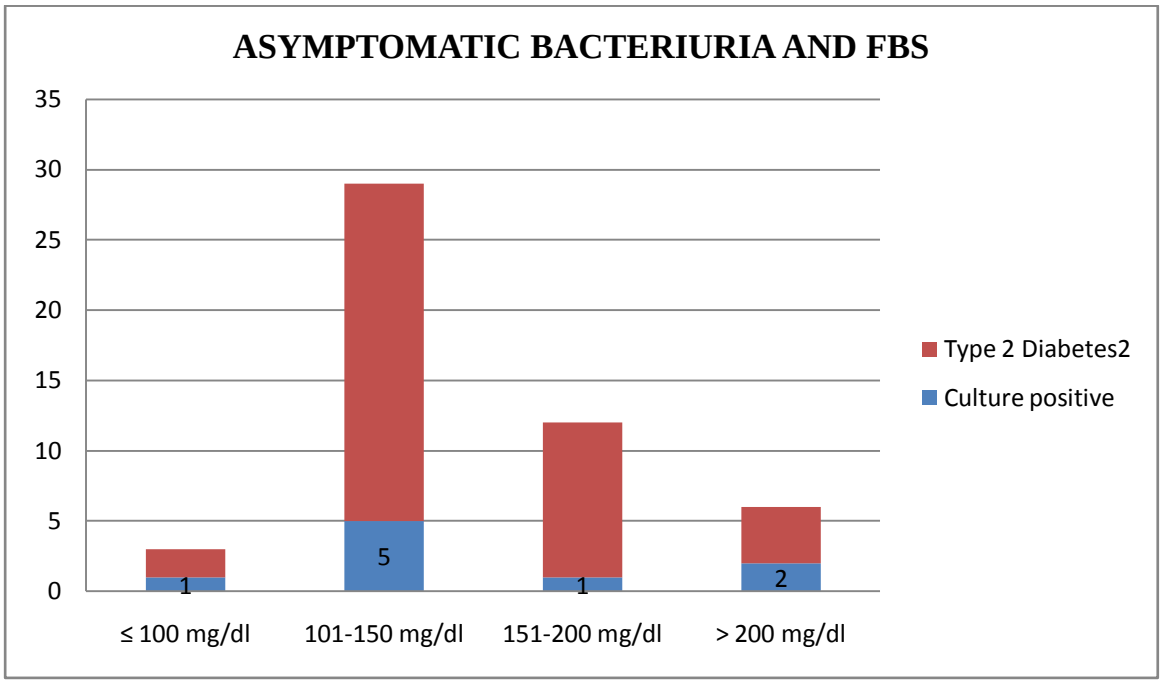
Fasting Blood Sugar	CASES	CONTROL
N	50	50
Mean	147.98	92.50
SD	49.08	10.83
P value Unpaired t Test		**0.0001**

FBS	CASES		CONTROLS		P value Unpaired t Test
	ABU +	ABU -	ABU +	ABU -	0.0001
Mean Levels (mg/dl)	158.46	145.78	92.51	92.33	

In diabetics the mean fasting blood sugar is 145.78 mg/dl among ABU +ve patients and 148.46 mg/dl among ABU –ve patients. In control group, the mean fasting blood sugar is 148.46 mg/dl among ABU +ve patients and 92.51 mg/dl among ABU –ve patients The increased mean FBS in group type 2 diabetes among ABU +ve compared to ABU –ve patients and controls is statistically significant as the **p value is 0.0001**as per unpaired t-test indicating a true difference among study groups.

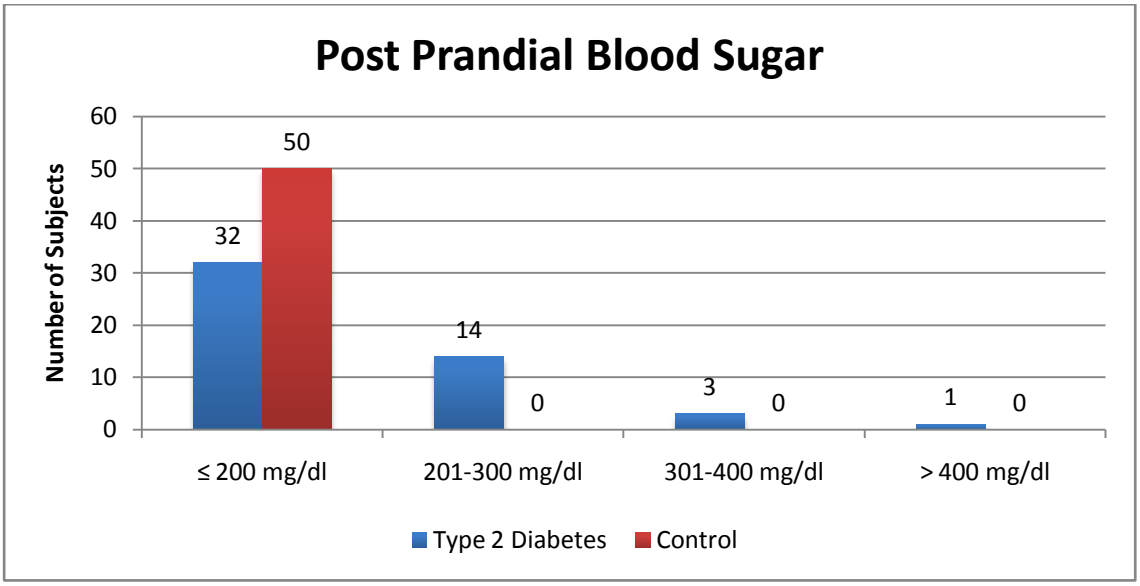
The mean FBS was meaningfully more in diabetic ABU+ve patients compared to ABU-ve patients by 12.68 mg/dl. The mean FBS was meaningfully more in diabetic ABU+ve patients compared to control group by 65.95 mg/dl. This significant difference of 1.09 times increase in mean FBS levels diabetics (ABU+ve Vs ABU-ve) and 1.71 times increase when compared to control group is true and has not occurred by chance.

In this study we can safely conclude that the mean FBS levels is significantly impaired and increased in patients with type 2 diabetes with asymptomatic bacteriuria.



Fasting Blood Sugar	CASES	ABU	Percentage
≤ 100 mg/dl	3	1	33.3%
101-150 mg/dl	29	5	17.2%
151-200 mg/dl	12	1	8.3%
> 200 mg/dl	6	2	33.3%
Total	50	9	

POST PRANDIAL BLOOD SUGAR



Post Prandial Blood Sugar	CASES	%	CONTROL	%
≤ 200 mg/dl	32	64.00	50	100.00
201-300 mg/dl	14	28.00	0	0.00
301-400 mg/dl	3	6.00	0	0.00
> 400 mg/dl	1	2.00	0	0.00
Total	50	100	50	100

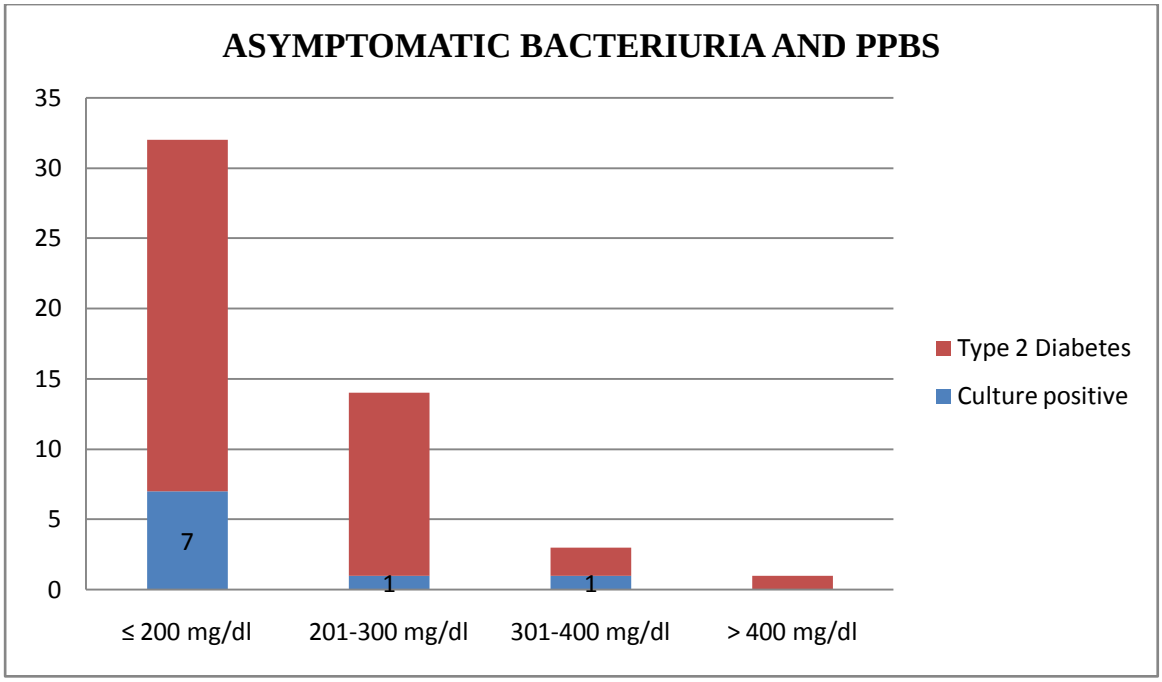
Post Prandial Blood Sugar	CASES	CONTROL
N	50	50
Mean	198.76	125.46
SD	65.37	9.17
P value Unpaired t Test		0.0001

PPBS	Type 2 Diabetes		Controls		P value Unpaired t Test
	ABU +	ABU -	ABU +	ABU -	
Mean Levels (mg/dl)	209.44	196.41	127.67	125.32	0.0001

In diabetic patients the mean post prandial blood sugar is 209.44 mg/dl among ABU +ve patients and 196.41 mg/dl among ABU –ve patients. In control group, the mean fasting blood sugar is 127.67 mg/dl among ABU +ve patients and 125.32 mg/dl among ABU –ve patients The increased mean PPBS in diabetics with ABU +ve compared to ABU –ve patients and controls is statistically significant as the p value is 0.0001as per unpaired t-test indicating a true difference among study groups.

The mean PPBS were meaningfully more in diabetic ABU+ve patients compared to ABU-ve patients by 13.03 mg/dl. The mean PPBS was meaningfully more in diabetics with ABU+ve compared to control group by 81.77 mg/dl. This significant difference of 1.07 times increase in mean PPBS levels in group type 2 diabetes patients (ABU+ve Vs ABU-ve) and 1.64 times increase when compared to control group is true and has not occurred by chance.

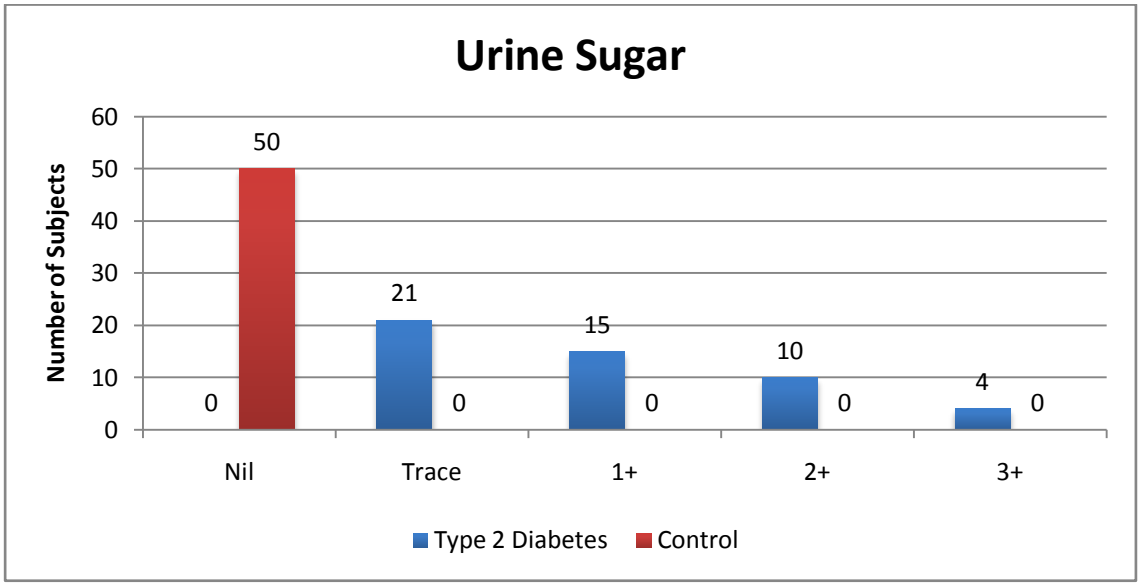
In this study we can safely conclude that the mean PPBS levels is significantly impaired and increased in patients with type 2 diabetes with asymptomatic bacteriuria.



PPBS	Type 2 Diabetes	Culture positive	Percentage
≤ 200 mg/dl	32	7	21.9%
201-300 mg/dl	14	1	7.1%
301-400 mg/dl	3	1	33.3%
> 400 mg/dl	1	0	0

Patients with PPBS between 301 and 400 had maximum percentage of culture positive bacteriuria

URINE SUGAR



Urine Sugar	CASES	%	CONTROL	%
Nil	0	0.00	50	100.00
Trace	21	42.00	0	0.00
1+	15	30.00	0	0.00
2+	10	20.00	0	0.00
3+	4	8.00	0	0.00
Total	50	100	50	100
P value Fishers Exact Test			0.0001	

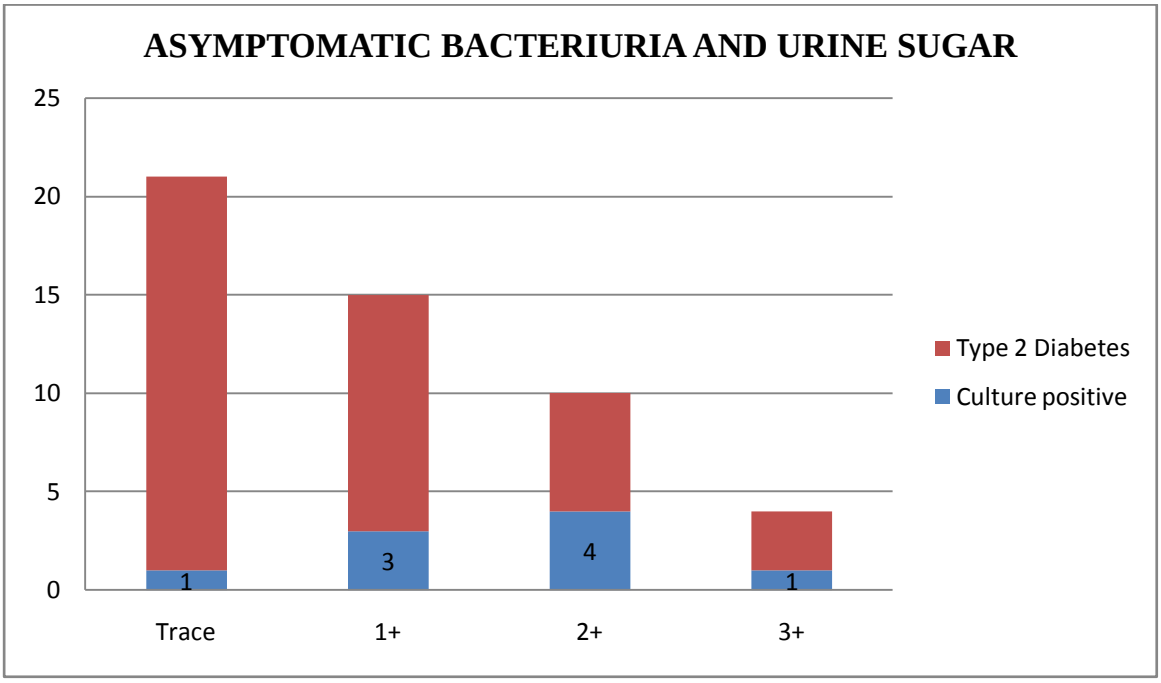
Urine Sugar	CASES		CONTROLS		P value Fishers Exact Test
	ABU +	ABU -	ABU +	ABU -	0.0001
Urine Sugar Positivity	6/9	23/41	0	0	

Among diabetics, majority had trace urine sugar (n=21,42%). In control group majority showed nil urine sugar (n=50, 100%) The increased incidence of positive urine sugar in diabetic group compared to the control group is statistically significant as the p value is 0.0001as per fishers exact test indicating a true difference among study groups.

The urine sugar results were meaningfully more in diabetic group with ABU+ve compared to ABU-ve group by 10 percentage points. This significant difference of 1.18 times increase in diabetics with ABU+ve compared to ABU-ve group is true and has not occurred by chance.

In this study we can safely conclude that urine sugar measurements is significantly impaired and increased in patients with type 2 diabetes with asymptomatic bacteriuria.

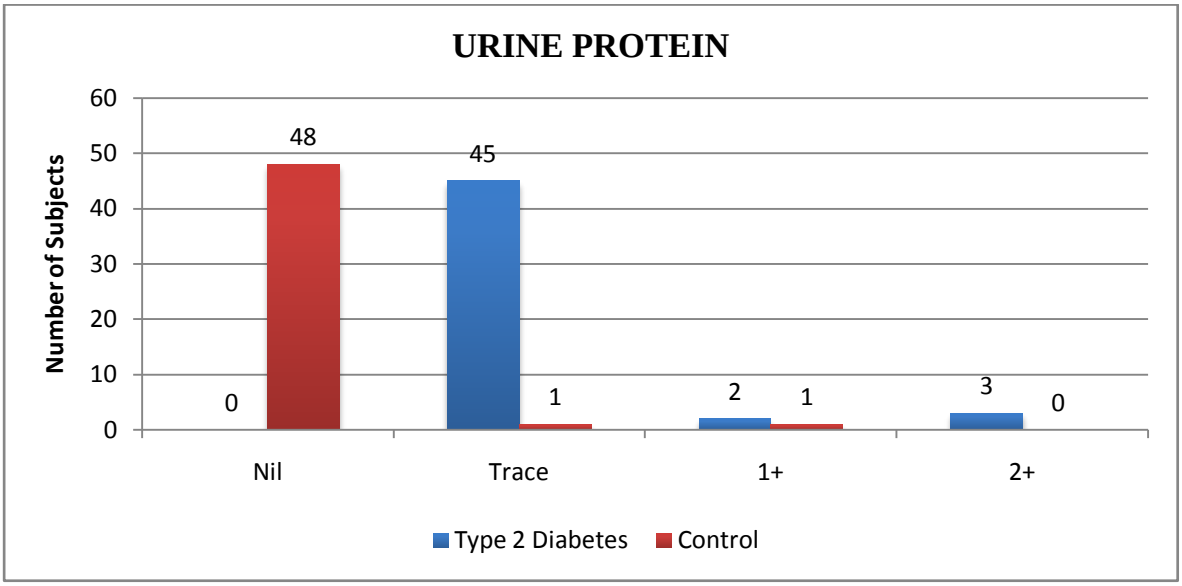
ASYMPTOMATIC BACTERIURIA AND URINE SUGAR



Urine Sugar	Type 2 Diabetes	Culture positive	Percentage
Trace	21	1	4.8%
1+	15	3	20%
2+	10	4	40%
3+	4	1	25%
Total	50	9	

There was better correlation of culture positive bacteriuria with urine sugar than with blood sugar levels. Only 4.8% with trace sugar in urine had culture positivity while 40% with 2+ urine sugar showed culture growth.

URINE PROTEIN



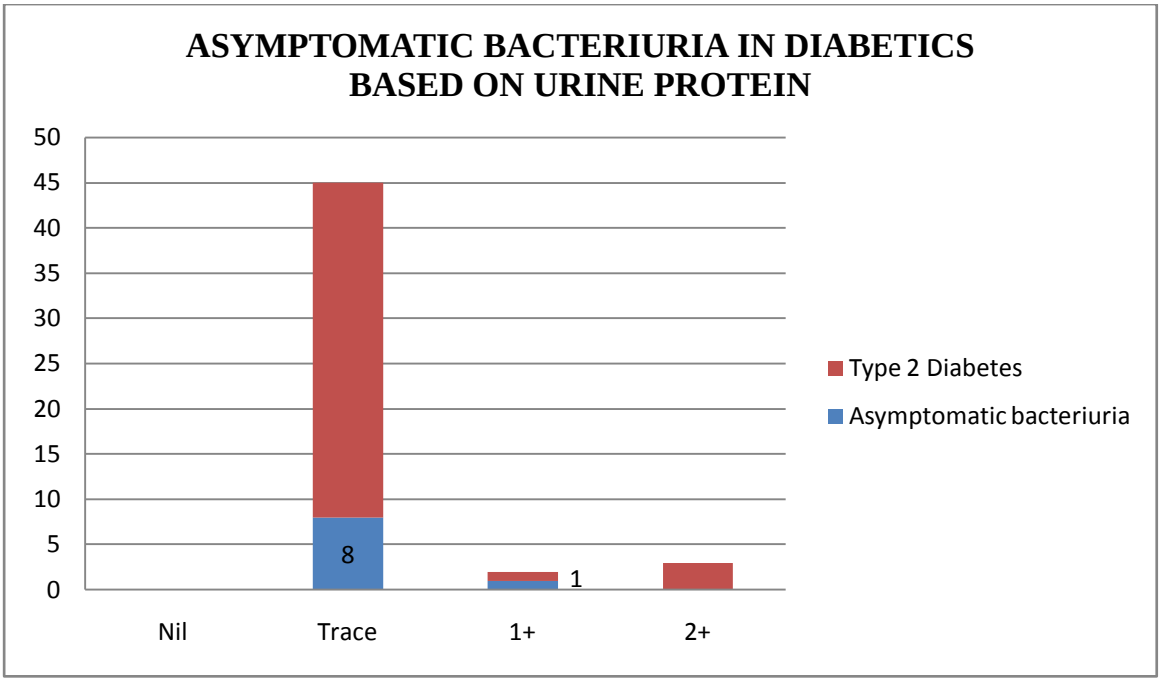
Urine protein	Type 2 Diabetes	%	Control	%
Nil	0	0.00	48	96.00
Trace	45	90.00	1	2.00
1+	2	4.00	1	2.00
2+	3	6.00	0	0.00
Total	50	100	50	100
P value Fishers Exact Test			0.0001	

Urine protein	Type 2 Diabetes		Controls		P value Fishers Exact Test
	ABU +	ABU -	ABU +	ABU -	0.0001
Urine Albumin Positivity	1/9	4/41	1/3	1/47	

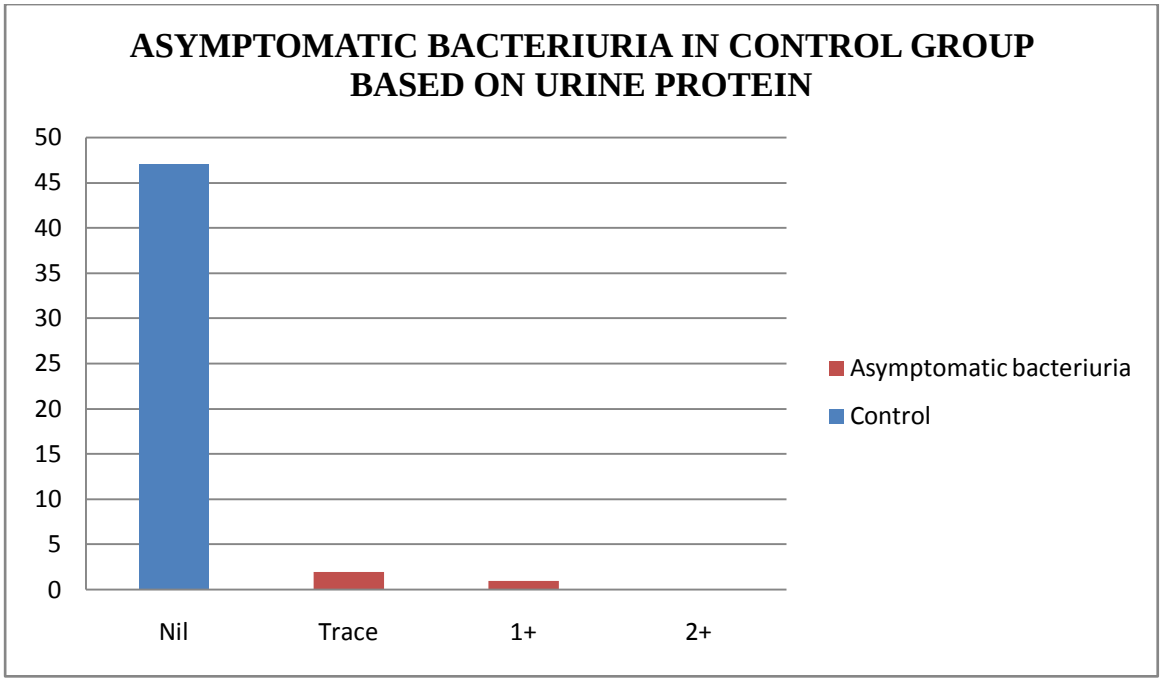
In patients with type 2 diabetes, majority of the patients exhibited trace urine protein (n=45, 90%). In control group majority exhibited nil urine protein (n=48, 96%). The increased incidence of positive urine protein in diabetic group compared to the control group is statistically significant as the p value is 0.0001as per fishers exact test indicating a true difference among study groups.

The urine protein results were meaningfully more in group type 2 diabetes with ABU+ve compared to ABU-ve group by 2%. This significant difference of 1.13 times increase in incidence in group type 2 diabetes with ABU+ve compared to ABU-ve group is true and has not occurred by chance.

In this study we can safely conclude that urine protein measurements is significantly impaired and increased in patients with type 2 diabetes with asymptomatic bacteriuria.

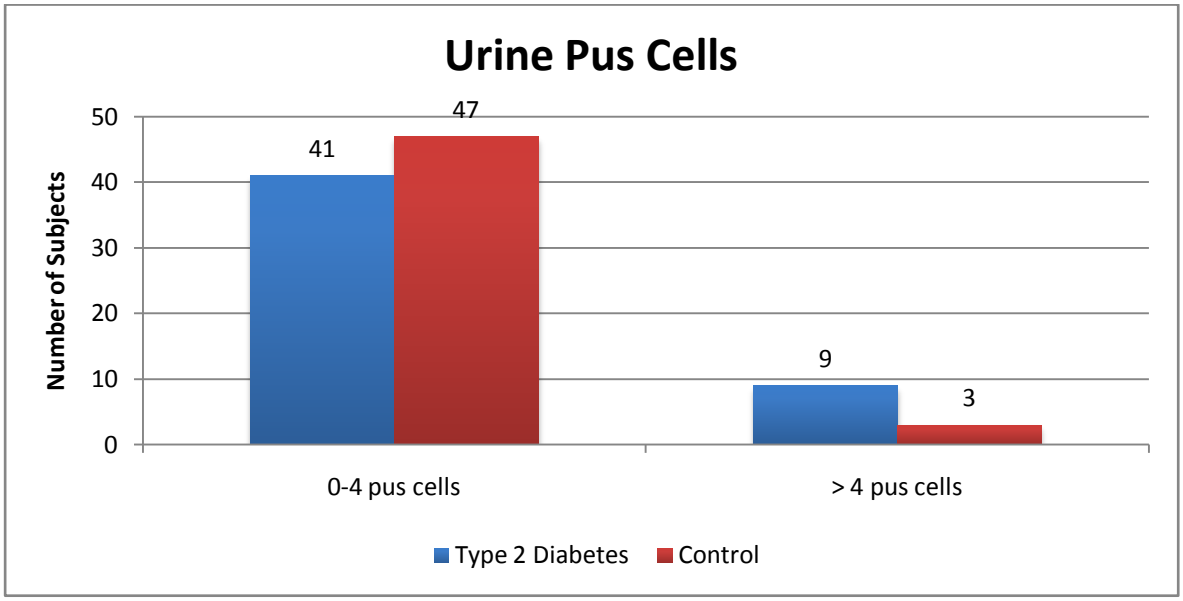


Urine Protein	Type 2 Diabetes	Asymptomatic bacteriuria	Percentage
Nil	0	0	0
Trace	45	8	17.77%
1+	2	1	50%
2+	3	0	0



Urine Albumin	Control	Asymptomatic bacteriuria	Percentage
Nil	47	0	0
Trace	2	2	100
1+	1	1	100
2+	0	0	0

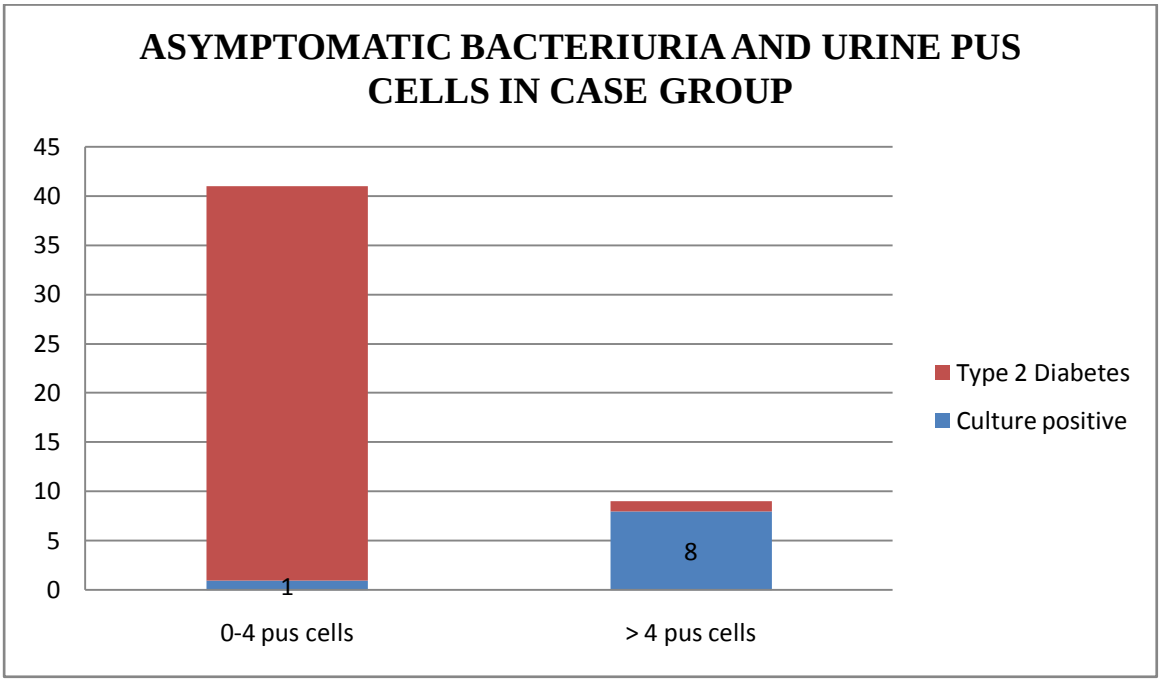
URINE PUS CELLS



Urine Pus Cells	Cases	%	Control	%
0-4 pus cells	41	82.00	47	94.00
> 4 pus cells	9	18.00	3	6.00
Total	50	100	50	100
P value Fishers Exact Test			0.0745	

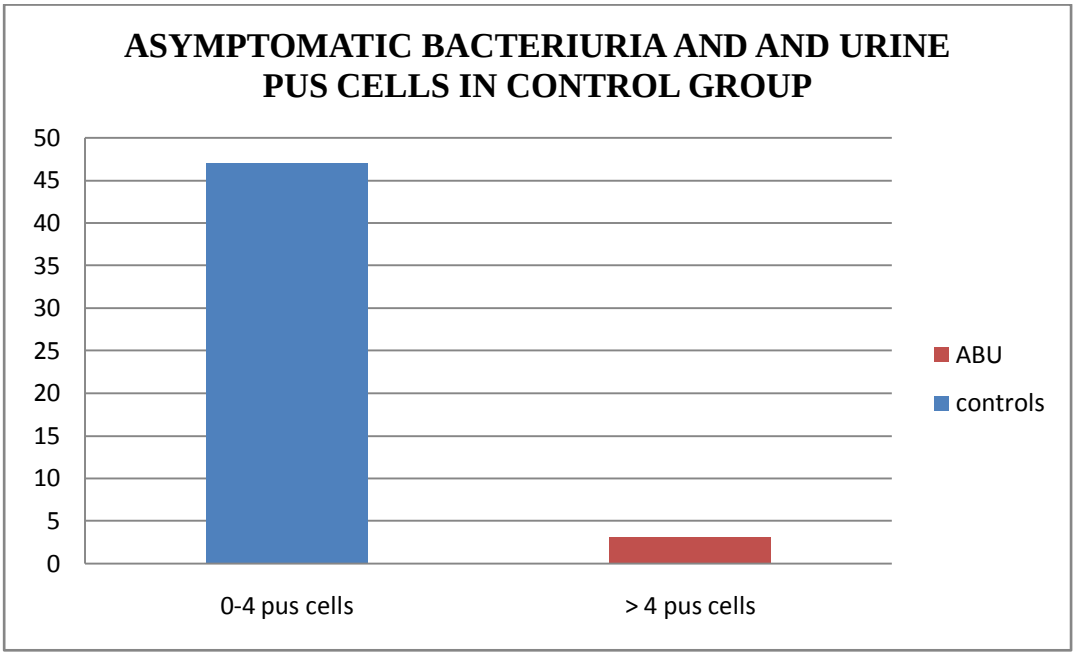
Majority of the type 2 diabetes group patients belonged to 0-4 pus cells class interval (n=41, 82%). In the control group, the same picture was reflected (n=47, 94%). The association between the intervention groups and urine pus cells is considered to be not statistically significant since $p > 0.05$ as per fishers exact test.

ASYMPTOMATIC BACTERIURIA AND URINE PUS CELLS



Urine Pus Cells	CASES	ABU	Percentage
0-4 pus cells	41	1	2.4%
> 4 pus cells	9	8	88.9%
Total	50	14	

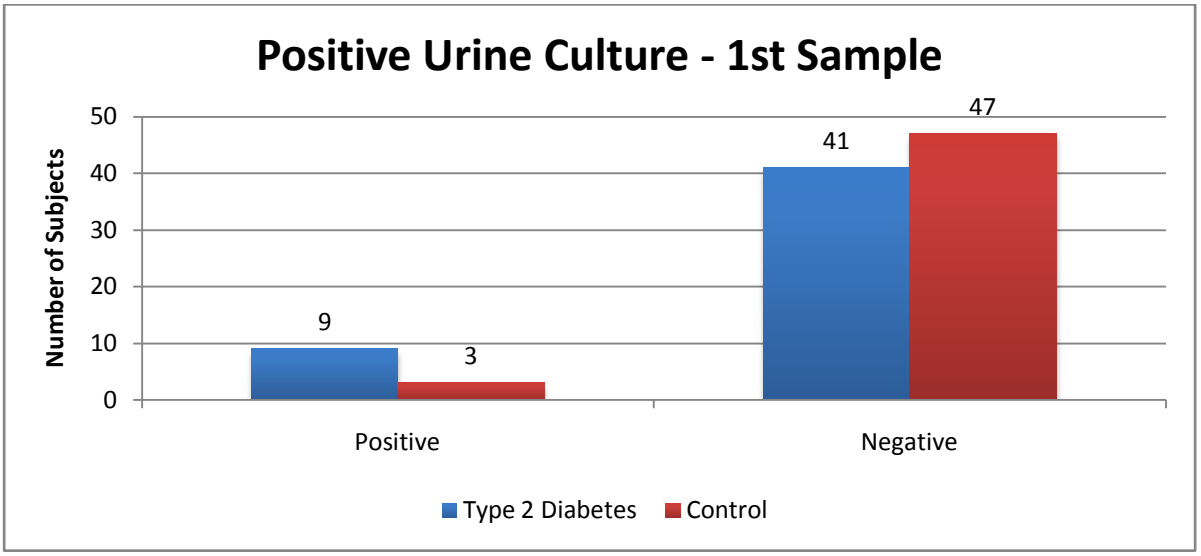
88.9% with urine pus cells more than 4 had culture positive bacteriuria.



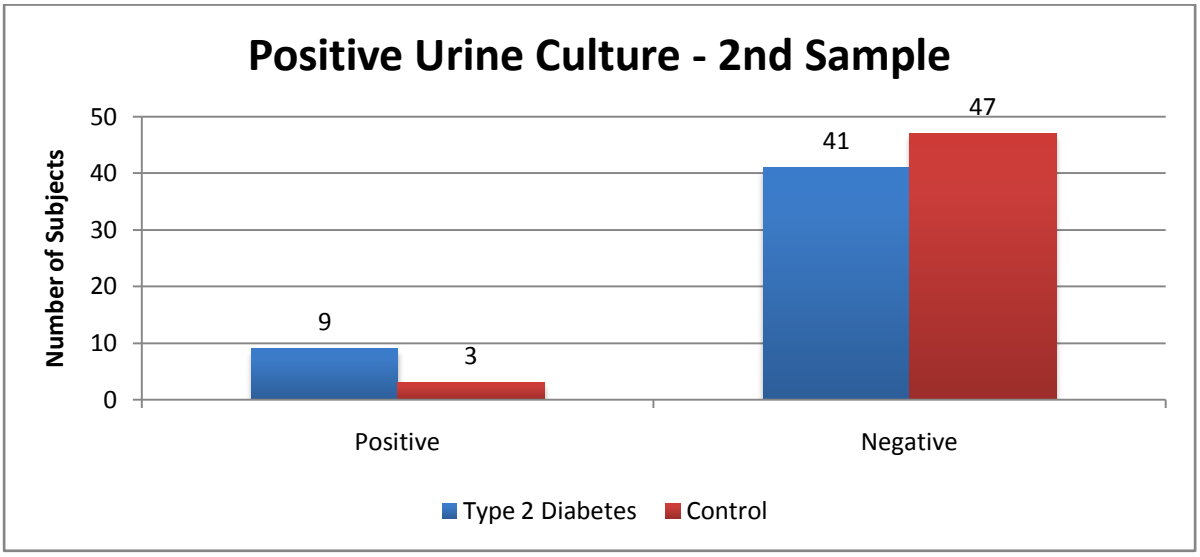
Urine Pus Cells	Controls	ABU	Percentage
0-4 pus cells	47	0	0
> 4 pus cells	3	3	100%
Total	50	3	

All patients with ABU in control group had presence of more than 4 pus cells in urine.

POSITIVE URINE CULTURE



Positive Urine Culture - 1st Sample	Type 2 Diabetes	%	Control	%
Positive	9	18.00	3	6.00
Negative	41	82.00	47	94.00
Total	50	100	50	100
P value Fishers Exact Test			0.0132	

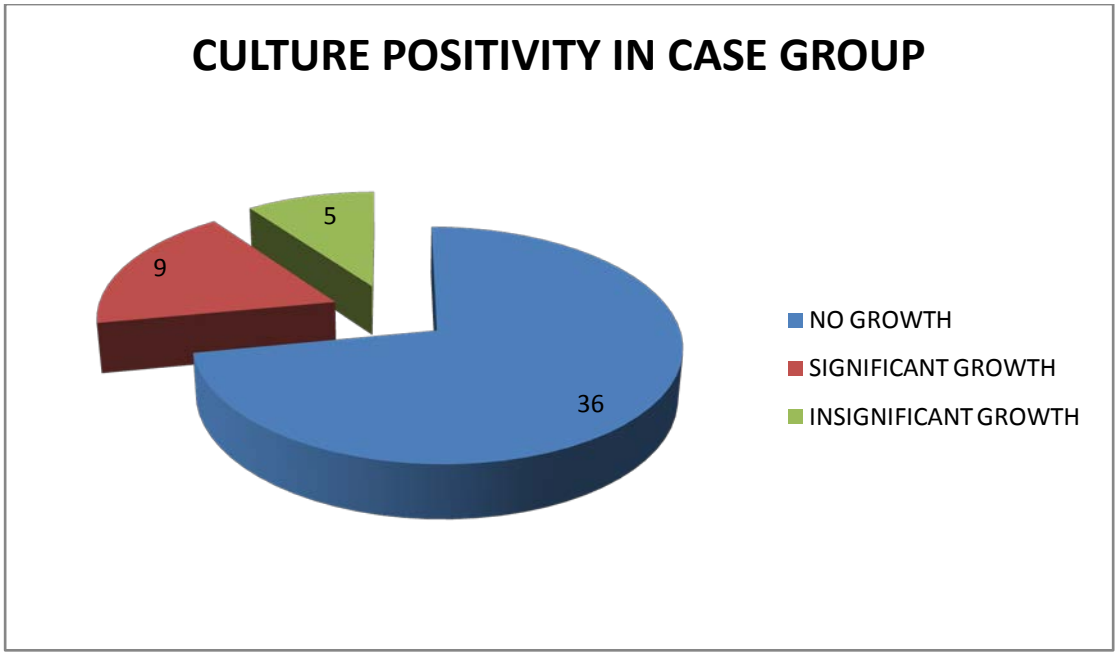


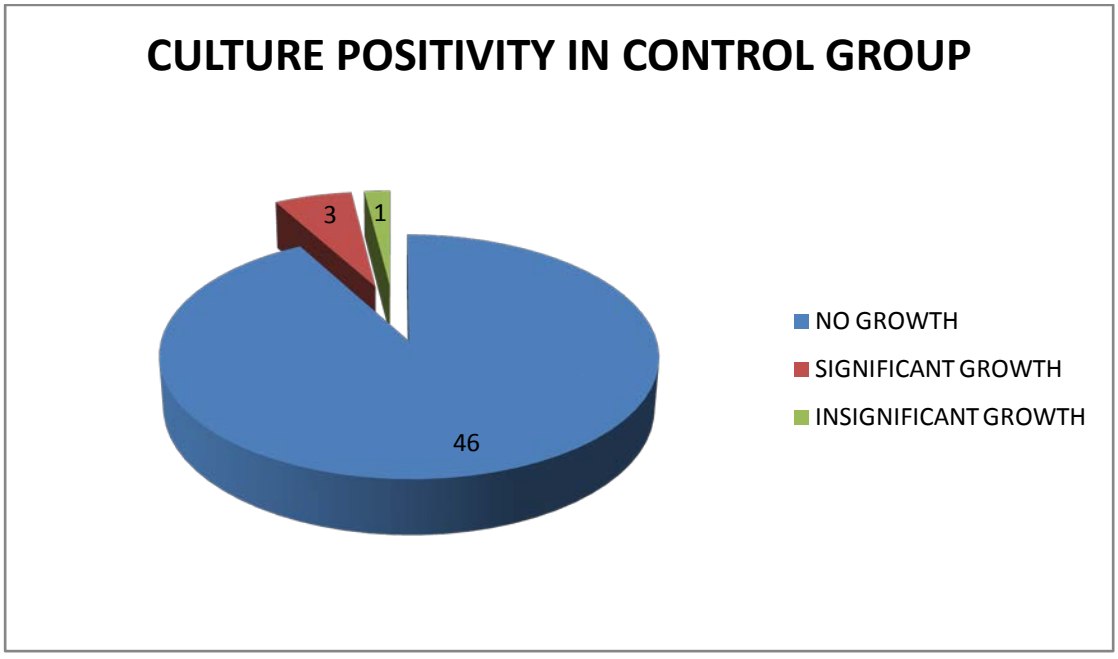
Positive Urine Culture – 2nd Sample	Type 2 Diabetes	%	Control	%
Positive	9	18.00	3	6.00
Negative	41	82.00	47	94.00
Total	50	100	50	100
P value Fishers Exact Test			0.0132	

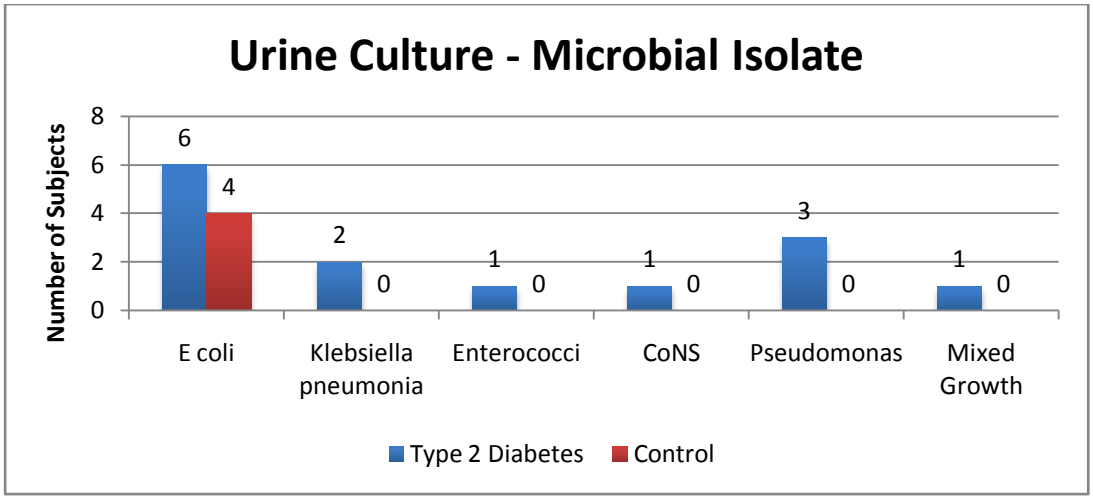
Among diabetic patients, many of them exhibited positive urine culture in the 1st and 2nd sample (n=9, 18%). In control group few exhibited positive urine culture (n=3, 6%) The increased incidence of positive urine culture in group type 2 diabetes compared to the control group is statistically significant as the p value is 0.0132as per fishers exact test indicating a true difference among study groups.

The positive urine culture results were meaningfully more in diabetic group compared to control group by 12%. This significant difference of 3 times increase in incidence of positive urine culture test in diabetic group compared to control group is true and has not occurred by chance.

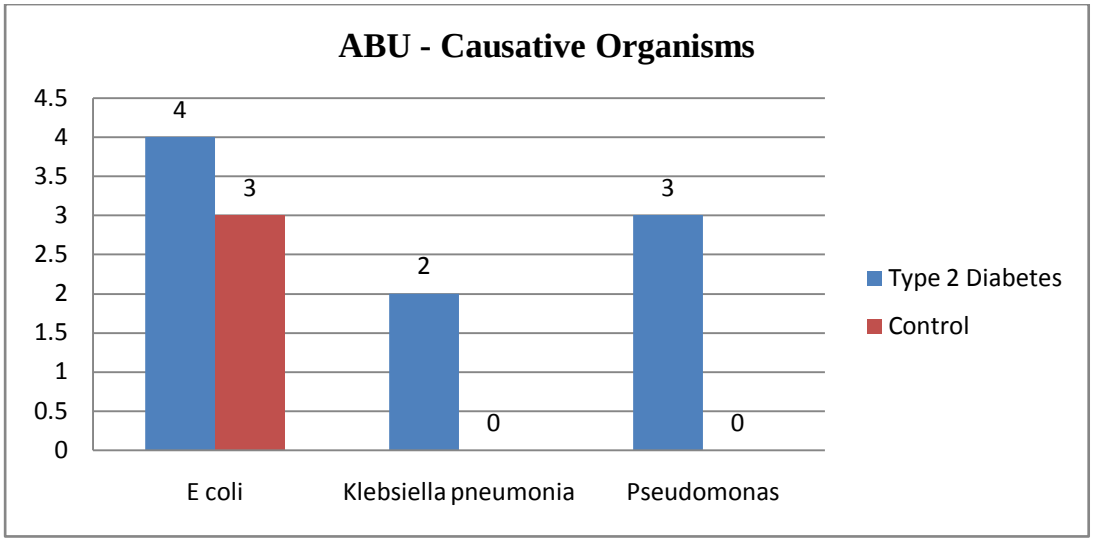
In this study we can safely conclude that asymptomatic bacteriuria is significantly increased in patients with type 2 diabetes.


CULTURE POSITIVITY IN CASE GROUP
5
9
36
NO GROWTH
SIGNIFICANT GROWTH
INSIGNIFICANT GROWTH


CULTURE POSITIVITY IN CONTROL GROUP
3
1
46
NO GROWTH
SIGNIFICANT GROWTH
INSIGNIFICANT GROWTH



ABU – CAUSATIVE ORGANISMS



ABU-Causative Organisms	Cases	%	Control	%	P value Fishers Exact Test
E coli	4	44.4	3	100	0.0915
Klebsiella pneumonia	2	22.2	0	0	0.9999
Pseudomonas	3	33.3	0	0	0.9999
Total	9	100	3	100	

DRUG SENSITIVITY

Type 2 Diabetes - Microbial Drug Sensitivity	Cefotoxime	Amikacin	Gentamicin	Ciprofloxacin	Norfloxacin	Vancomycin	Cotrimoxazole
E coli	3	4	4	2	4	0	0
Klebsiella pneumonia	1	2	1	1	2	0	1
Pseudomonas	2	3	3	3	3	0	0
Total	6	9	8	6	9	0	1

Control - Microbial Drug Sensitivity	Cefotoxime	Amikacin	Gentamicin	Ciprofloxacin	Norfloxacin	Vancomycin	Cotrimoxazole
E coli	3	3	3	3	3	0	0
Klebsiella pneumonia	0	0	0	0	0	0	0
Pseudomonas	0	0	0	0	0	0	0
Total	3	3	3	3	3	0	0

RISK FACTORS FOR WOMEN WITH TYPE 2 DIABETES

Diabetic Group	ABU +	ABU -
Number	9	41
Age (Mean years)	55.67	53.80
Duration of Diabetes (Mean years)	6.44	4.10
FBS (Mean) mg/dl	158.46	145.78
PPBS (Mean) mg/dl	209.44	196.41
Macroalbuminuria	1	4
Urine Pus Cells > 4 cells/cu.mm	8	1

Control Group	ABU +	ABU -
Number	3	47
Age (Mean years)	58.67	52.94
FBS (Mean) mg/dl	92.51	92.33
PPBS (Mean) mg/dl	127.67	125.32
Macroalbuminuria	1	4
Urine Pus Cells > 4 cells/cu.mm	3	1

Independent Variables	Dependent variable - ABU		
	Odds Ratio	95% Confidence Interval	P value
Age > 50 years	0.96	0.94-0.99	0.8225
Diabetic	1.62	0.56-3.84	0.0074
Duration of Diabetes > 5 years	5.36	0.48-59.92	0.2092
FBS > 150 mg/dl	1.10	0.86-1.41	0.4365
PPBS > 300 mg/dl	1.37	0.71-2.63	0.8649
Urine Sugar Positivity	3.04	1.33-6.95	0.0015
Macroalbuminuria	1.91	0.33-38.4	0.5819
Urine Pus Cells > 4 cells/cumm	4.29	1.12-16.52	0.0001

Type 2 diabetic patients have 1.62 times significantly more risk of developing asymptomatic bacteriuria than patients in the control group. It is statistically significant with a p-value of 0.0074.

Type 2 diabetic patients with urine sugar positivity have 3.04 times significantly more risk of developing asymptomatic bacteriuria than patients in the control group. It is statistically significant with a p-value of 0.0015.

Type 2 diabetic patients with Urine Pus Cells > 4 cells/cu.mm have 4.29 times significantly more risk of developing asymptomatic bacteriuria than patients in the control group. It is statistically significant with a p-value of 0.0001.

Discussion

DISCUSSION

The study confirms an increased prevalence of asymptomatic bacteriuria in diabetic women(18%) compared to non-diabetic women(6%). This is supported by various other studies. Study by Suzanne Geerlings & associates showed that the prevalence of asymptomatic bacteriuria was 26% in diabetic women compared to 6% in non-diabetic women.[5] Study by Ruby Meiland et al on asymptomatic bacteriuria in diabetic women showed that the prevalence of asymptomatic bacteriuria in diabetic population including both type 1 and type 2 diabetes was 17%.[9] The Infectious Disease Society of America claims that the prevalence of ABU in diabetic women varies from 9% to 27%,compared to 1% to 5% in non-diabetic healthy women, based on meta-analysis of various studies. In the meta-analysis of observational studies by Marjo Renko, they were able to show that the prevalence of ABU was three times higher in all patients with diabetes compared with control subjects.[11] a similar observation was also noted in the study by Mendoza etal.[22]

Age

This study does not show increasing risk of ABU with increasing age. But the study by Geerlings & associates show that increasing age is an important risk factor for ABU in diabetic women.[5] The Infectious Disease Society of America claims that the prevalence of ABU in elderly women in the community (age $\geq$ 70 years) is 10.8% to 16% compared to 1 to 5% in

healthy non- diabetic premenopausal women.[1] Study by Meiland et al shows increasing prevalence of ABU with increasing age in the study group.[9]

Duration of diabetes

This study shows that among patients with diabetes for more than 10 years 50% had culture positive urinary tract infection compared to 15.4% of those with diabetes for less than one year. But the statistical significance of duration of diabetes as a risk factor for ABU could not be proved. Study by Suzanne Geerlings & associates show that the risk of ABU is more with increasing duration of diabetes. The IDSA claims that ABU better correlates with the duration of diabetes rather than the biochemical parameters of glycemic control.[1] Marjo Renko showed in his meta-analysis of various observational studies that the mean duration of diabetes was longer in patients with ABU than in those without ABU.

Glycemic Control

Though this study shows that the mean FBS and PPBS are significantly impaired and increased in diabetic women with ABU, the relationship between ABU and glycemic control could not be fully established as correlation with HbA1c was not attempted. The IDSA claims that ABU does not correlate with the biochemical parameters of glycemic control based on various observational studies.[1] Poor glycemic control has been shown to not correlate with the frequency of bacteriuria. Schmitt *et al*.

found no relationship between HbA1c and bacteriuria in 752 type 2 DM patients. In another study by Rayfield, which compared HbA1c with ABU, the mean HbA1c was 11.5% in bacteriuric and 11.4% in non-bacteriuric diabetic women.[4] Study by Mendoza et al. also showed no correlation between ABU and fasting blood sugar or HbA1c.[22]

Glycosuria

This study shows better correlation of culture positive bacteriuria with urine sugar than with blood sugar levels. Only 4.8% with trace sugar in urine had culture positivity whereas 40% with 2+ urine sugar showed culture growth. Study by Mohammed Ali Boroumand in Iranian women showed a significant relationship between ABU and glycosuria.[21] Similar results were also observed in a study conducted on Tanzanian women by Eligus F. Lyamuya et al. which showed that ABU was present in 16.6% of the diabetic individuals with glycosuria compared to 8% in diabetic individuals without glycosuria. But a study by Mikobiyol et al. shows no correlation between bacteriuria and glycosuria.[19]

Urine pus cells

This study shows that 88.9% diabetic patients with urine pus cells more than 4 had asymptomatic bacteriuria. Study by Boroumand et al inIranian women showed similar results of significant relationship of ABU with pyuria. The above observation is also supported by the study by Mikobiyol et al. which showed a positive correlation between pyuria and

asymptomatic bacteriuria. The IDSA states that increased presence of pus cells in urine accompanies ABU in 32% of young healthy non-diabetic women, but upto 70 % in diabetic women.

Proteinuria

All the diabetic patients with ABU had associated proteinuria in this study. 88.89% was associated with trace proteins in urine. 11.11% had 1+ protein in urine. Study by Geerlings & associates show that macroalbuminuria is associated with increased risk of ABU.[5] a study reports that the prevalence of bacteriuria in patients with diabetic nephropathy may be as high as 13%.[4] Observations by Ruby Meiland et al. also state that ABU has a positive correlation with long standing complications of diabetes mellitus like microalbuminuria or macroalbuminuria.

Culture positivity

4 patients in the control group had a growth in both the first and second culture, out of which 3 were significant. All the 4 specimens grew Escherichia coli. In the diabetic group, 12 patients had growth in both the first and second culture of which 9 were significant. 4 cultures grew Escherichia coli, 2 cultures grew Klebsiella pneumonia and 3 cultures grew Pseudomonas aeruginosa. Escherichia coli was the most common organism isolated in both diabetic and non-diabetic women with ABU. It accounted for 100% of the growths in control group and 44.44% of the growths in the diabetic group. Klebsiella pneumonia accounted for 22.22% and

pseudomonas aeruginosa accounted for 33.33% of the growths in diabetic women. Various studies have proven Escherichia coli to be the single most important organism responsible for bacteriuria. Leibovici et al showed in his study that Klebsiella pneumonia was responsible for 25% of the cases of ABU in diabetics which is similar to the observation in this study. But in the study by Meiland, Klebsiella pneumonia was isolated in only 6 % of the diabetic cases of ABU. Incidence of organisms other than Escherichia coli appears to be increased in diabetics with ABU compared to non-diabetics with ABU. Geerlings et al also noted a lower percentage of *E. coli* in women with diabetes versus women without the disease (42 vs. 78%).[5] Lye et al. also showed that *E. coli* is the most common microorganism in UTIs in diabetic patients, but that *E. coli* occurs in significantly lesser proportion than in control subjects. According to the IDSA, pseudomonas commonly causes ABU in men and women with long term urological devices in place. But in this study, Pseudomonas was isolated from 33.33% of the cultures positive for ABU in diabetic women.

Antibiotic sensitivity

This study shows that in diabetics, 2 out of 4 E. coli strains(50%) isolated in urine were sensitive to cefotaxime, amikacin, gentamycin, ciprofloxacin and norfloxacin. One strain(25%) was sensitive only to amikacin gentamycin and norfloxacin and another(25%) was sensitive to cefotaxime, amikacin, gentamycin and norfloxacin. All the 4 strains were resistant to cotrimoxazole. This is in contrast to the observations in various study

results, which consider cotrimoxazole to be the drug of choice in urinary infection. This is probably because of the extensive usage of cotrimoxazole as empirical therapy in various conditions leading to the development of resistance to this drug.

Of the two strains of Klebsiella pneumonia, one was sensitive to cefotaxime, amikacin, gentamycin, ciprofloxacin, norfloxacin and cotrimoxazole, while the other strain was sensitive only to amikacin and norfloxacin.

Of the three strains of Pseudomonas aeruginosa, two were sensitive to cefotaxime, amikacin, gentamycin, ciprofloxacin and norfloxacin, while the other strain was sensitive only to amikacin, gentamycin, ciprofloxacin and norfloxacin.

Though various studies have shown that resistance to fluoroquinolones is an emerging threat, this study shows that most of the organisms isolated in both diabetic and non-diabetic population were sensitive to fluoroquinolones.

Aminoglycosides, amikacin and gentamycin also have good coverage against the isolated uropathogens in both the diabetic and non-diabetic population.

Conclusion

CONCLUSION

- Women with Type 2 diabetes mellitus have 1.62 times significantly more risk of developing asymptomatic bacteriuria than patients in the control group.
- The prevalence of asymptomatic bacteriuria in type 2 diabetic group was 18%.
- The prevalence of asymptomatic bacteriuria in control group was 6%
- There was no statistical correlation between asymptomatic bacteriuria and duration of diabetes.
- No correlation between asymptomatic bacteriuria and glycemic control could be established.
- Asymptomatic bacteriuria was significantly associated with glycosuria in diabetic individuals.
- Asymptomatic bacteriuria was significantly associated with presence of more than 4 pus cells in urine in both diabetic and non diabetic individuals.
- Escherichia coli was the most common cause of ABU in both diabetic and non-diabetic women in this study.
- Most of the isolated micro organisms in both diabetic and non-diabetic women were resistant to cotrimoxazole.
- All the isolated micro organisms in both the diabetic and non-diabetic groups were sensitive to norfloxacin.

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Annexure

ABBREVIATIONS USED

ABU – ASYMPTOMATIC BACTERIURIA

CFU – COLONY FORMING UNITS

DM – DIABETES MELLITUS

IFG – IMPAIRED FASTING GLUCOSE

IGT – IMPAIRED GLUCOSE TOLERANCE

MODY – MATURITY ONSET DIABETES OF YOUNG

ATP – ADENOSINE TRI PHOSPHATE

DNA – DEOXY RIBONUCLEIC ACID

GDM – GESTATIONAL DIABETES MELLITUS

OGTT – ORAL GLUCOSE TOLERANCE TEST

HbA1C – HEMOGLOBIN A1C

BMI – BODY MASS INDEX

HDL – HIGH DENSITY LIPOPROTEIN

TG – TRIGLYCERIDES

DKA – DIABETIC KETOACIDOSIS

HHS – HYPERGLYCEMIC HYPEROSMOLAR STATE

HONKC – HYPEROSMOLAR NON-KETOTIC COMA

UTI – URINARY TRACT INFECTION

CONS – COAGULASE NEGATIVE STAPHLYCOCCUS

DCA – DEOXY CHOLATE CITRATE AGAR

IDSA – INFECTIOUS DISEASE SOCIETY OF AMERICA

Master chart and

Master chart coding

Cases

SL NO	AGE	DU	fbs	ppbs	urine routine	UC 1	S1	UC 2	S2	usg	UC3	S3
1	45	2	184	254	s++, pt, pus3	no	nil	no	nil	n		
2	45	4	140	192	s+, pt, pus3	no	nil	no	nil	n		
3	45	1	120	184	s+, pt, pus5	EC 10^5	ce, a , g, ci, n	EC 10^5	ce, a , g, ci, n	n	no	Nil
4	45	3	264	392	s+++, p++, pus3	no	nil	no	nil	n		
5	42	4	132	192	s+, pt, pus2	no	nil	no	nil	n		
6	50	10	160	240	s++, pt, pus5	P 10^5	ce, a , g, ci, n	P 10^5	ce, a , g, ci, n	n	no	nil
7	50	4	114	182	s++, pt, pus5	EC 10^2	a, g	EC 10^2	a, g	n		
8	47	6	135	162	s+, pt, pus3	cons 10^2	ce	no	nil	n		
9	46	1	99	191	s+, pt, pus5	P 10^5	a, g, ci, n	P10^5	a, g, ci, n	n	no	nil
10	49	1	184	239	s+, pt, pus2	no	nil	no	nil	n		
11	53	7	135	165	s++, pt, pus5	EC 10^5	a, g, n	EC 10^5	a, g, n	n	no	nil
12	55	6	114	208	s++, pt, pus5	KP 10^5	a, n	KP 10^5	a, n	n	no	nil
13	52	8	210	270	s++, pt, pus3	no	nil	no	nil	n		
14	55	4	140	200	s+, pt, pus3	E 10^2	v, ce, ci, n	E 10^2	v, ce, ci, n	n		
15	54	1	110	142	st, pt, pus3	no	nil	no	nil	n		
16	57	6	152	201	st, pt, pus3	no	nil	no	nil	n		
17	56	3	320	440	s+++, p++, pus3	M	nil	no	nil	n		
18	56	3	120	140	st, pt, pus3	no	nil	no	nil	n		
19	57	11	111	142	st, pt, pus3	no	nil	no	nil	n		
20	58	2	132	168	st, pt, pus3	no	nil	no	nil	n		
21	43	1	130	192	st, pt, pus3	no	nil	no	nil	n		
22	41	1	122	181	st, pt, pus3	no	nil	no	nil	n		
23	45	4	120	142	st, pt, pus3	no	nil	no	nil	n		
24	45	3	115	142	st, pt, pus3	no	nil	no	nil	n		
25	42	6	110	148	st, pt, pus3	no	nil	no	nil	n		
26	48	1	69	102	st, pt, pus3	no	nil	no	nil	n		
27	50	1	106	215	s+, pt, pus3	no	nil	no	nil	n		
28	47	3	280	310	s+++, p++, pus3	no	nil	no	nil	n		
29	47	1	111	138	st, pt, pus3	no	nil	no	nil	n		
30	50	4	112	146	st, pt, pus3	EC 10^2	a, g	EC 10^2	a,g	n		
31	55	4	168	225	s+, pt, pus3	no	nil	no	nil	n		
32	54	4	210	245	s++, pt, pus5	P 10^5	ce, a , g, ci, n	P 10^5	ce, a , g, ci, n	n	no	nil
33	55	1	124	153	st, pt, pus3	no	nil	no	nil	n		
34	53	12	124	146	st, pt, pus3	EC 10^5	ce, a , g, ci, n	EC 10^5	ce, a , g, ci, n	n	no	nil
35	54	7	106	138	st, pt, pus3	no	nil	no	nil	n		
36	57	1	84	116	st, pt, pus3	no	nil	no	nil	n		
37	60	10	106	162	st, pt, pus2	no	nil	no	nil	n		
38	57	1	193	243	s++, pt, pus2	no	nil	no	nil	n		
39	60	10	142	184	s+, pt, pus2	no	nil	no	nil	n		
40	60	3	200	280	s++, p+, pus3	no	nil	no	nil	n		
41	70	6	123	147	st, pt, pus2	no	nil	no	nil	n		

42	65	6	134	157	st, pt, pus2	no	nil	no	nil	n		
43	70	1	184	238	s++, pt, pus2	no	nil	no	nil	n		
44	80	14	210	314	s+++, p+, pus6	KP 10^5	ce, a , g, ci, n, co	KP 10^5	ce, a , g, ci, n, co	n	no	nil
45	65	3	140	192	s+, pt, pus6	EC 10^5	ce, a, g, n	EC 10^5	ce, a, g, n	n	no	nil
46	64	15	132	168	st, pt, pus2	no	nil	no	nil	n		
47	63	6	180	234	s+, pt, pus2	no	nil	no	nil	n		
48	62	3	166	184	s+, pt, pus2	no	nil	no	nil	n		
49	62	4	152	182	s+, pt, pus2	no	nil	no	nil	n		
50	66	3	170	210	s+, pt, pus2	no	nil	no	nil	n		

Control

SL NO	AGE	DU	fbs	ppbs	urine routine	UC 1	S1	UC 2	S2	usg	UC3	S3
1	45	nil	72	108	s-,p-,pus2	no	nil	no	nil	n		
2	42	nil	88	106	s-,p-,pus2	no	nil	no	nil	n		
3	42	nil	94	112	s-,p-,pus2	no	nil	no	nil	n		
4	41	nil	89	120	s-,p-,pus2	no	nil	no	nil	n		
5	41	nil	74	120	s-,p-,pus2	no	nil	no	nil	n		
6	41	nil	82	110	s-,p-,pus2	no	nil	no	nil	n		
7	43	nil	96	122	s-,p-,pus2	no	nil	no	nil	n		
8	41	nil	98	118	s-,p-,pus2	no	nil	no	nil	n		
9	45	nil	94	122	s-,p-,pus3	EC 10^3	ce, a ,g , ci, n	no	nil	n		
10	41	nil	76	111	s-,p-,pus2	no	nil	no	nil	n		
11	50	nil	106	139	s-,p-,pus2	no	nil	no	nil	n		
12	48	nil	103	132	s-,p-,pus2	no	nil	no	nil	n		
13	48	nil	94	121	s-,p-,pus2	no	nil	no	nil	n		
14	47	nil	80	107	s-,p-,pus2	no	nil	no	nil	n		
15	47	nil	92	124	s-,p-,pus2	no	nil	no	nil	n		
16	46	nil	106	136	s-,p-,pus2	no	nil	no	nil	n		
17	47	nil	103	134	s-,p-,pus2	no	nil	no	nil	n		
18	50	nil	98	134	s-,pt,pus5	EC 10^5	ce, a ,g , ci, n	EC 10^5	ce, a , g , ci, n	n	no	nil
19	47	nil	106	139	s-,p-,pus2	no	nil	no	nil	n		
20	50	nil	101	132	s-,p-,pus2	no	nil	no	nil	n		
21	51	nil	92	126	s-,p-,pus2	no	nil	no	nil	n		
22	55	nil	78	124	s-,p-,pus2	no	nil	no	nil	n		
23	52	nil	113	131	s-,p-,pus2	no	nil	no	nil	n		
24	55	nil	89	128	s-,p-,pus2	no	nil	no	nil	n		
25	55	nil	96	119	s-,p-,pus2	no	nil	no	nil	n		
26	54	nil	106	134	s-,p-,pus2	no	nil	no	nil	n		
27	51	nil	104	138	s-,p-,pus2	no	nil	no	nil	n		
28	55	nil	101	136	s-,p-,pus2	no	nil	no	nil	n		
29	55	nil	103	121	s-,p-,pus2	no	nil	no	nil	n		
30	51	nil	101	126	s-,p-,pus2	no	nil	no	nil	n		
31	57	nil	70	112	s-,p-,pus2	no	nil	no	nil	n		
32	58	nil	73	109	s-,p-,pus2	no	nil	no	nil	n		
33	60	nil	102	129	s-,p-,pus2	no	nil	no	nil	n		
34	60	nil	96	132	s-,p-,pus2	no	nil	no	nil	n		
35	57	nil	84	120	s-,p-,pus2	no	nil	no	nil	n		
36	59	nil	84	132	s-,p-,pus2	no	nil	no	nil	n		
37	60	nil	92	132	s-,p-,pus2	no	nil	no	nil	n		
38	59	nil	99	126	s-,p-,pus2	no	nil	no	nil	n		
39	56	nil	88	126	s-,p-,pus2	no	nil	no	nil	n		

40	57	nil	74	132	s-,p-,pus2	no	nil	no	nil	n		
41	65	nil	76	130	s-,p-,pus2	no	nil	no	nil	n		
42	65	nil	88	121	s-, p+, pus6	EC 10^5	ce, a ,g , ci, n	EC 10^5	ce, a , g , ci, n	n	no	nil
43	67	nil	94	121	s-,p-,pus2	no	nil	no	nil	n		
44	65	nil	98	132	s-,p-,pus2	no	nil	no	nil	n		
45	62	nil	103	138	s-,p-,pus2	no	nil	no	nil	n		
46	61	nil	91	128	s-,pt,pus6	EC 10^5	ce, a ,g , ci, n	EC 10^5	ce, a , g , ci, n	n	no	nil
47	65	nil	101	131	s-,p-,pus2	no	nil	no	nil	n		
48	62	nil	94	128	s-,p-,pus2	no	nil	no	nil	n		
49	70	nil	102	139	s-,p-,pus2	no	nil	no	nil	n		
50	63	nil	81	125	s-,p-,pus2	no	nil	no	nil	n		

KEY FOR MASTER CHART

URINE ROUTINE

SUGAR

- NO SUGAR

T TRACE AMOUNTS – 100mg/dl

+ 250 mg/dl

++ 500 mg/dl

+++ 1000 mg/dl

++++ 2000 mg/dl

PROTEIN

- NO PROTEIN

T TRACE AMOUNTS

+ <30 mg/dl

++ 30 – 100 mg/dl

+++ 100 – 300 mg/dl

++++ >300 mg/dl

DEPOSITS

PUS – PUS CELLS

URINE CULTURE

EC – E. COLI

E – ENTEROCOCCI

P – PSEUDOMONAS

KP – KLEBSIELLA PNEUMONIA

NO – NO GROWTH

SENSITIVITY

CE – CEFOTAXIM

A – AMIKACIN

G – GENTAMICIN

CI – CIPROFLOXACIN

N – NORFLOXACIN

CO – COTRIMOXAZOLE

PROFORMA

- NAME : SL. NO:

- AGE /SEX:
- OCCUPATION:
- ADDRESS WITH CONTACT NUMBER:

HISTORY

- h/o burning micturition
- h/o fever
- h/o lower abdomen pain
- h/o back pain
- h/o vomiting
- h/o nausea
- h/o blood in urine
- h/o sexual activity
- h/o white discharge per vaginum

- h/o drug intake
- h/o prior hospitalization
- DIABETES 1.YES 2. NO , if yes , duration –
- MENSTRUAL HISTORY

Relevant Physical examination

- Built& nourishment
- Skin Hydration
- Anemia
- Icterus
- Peripheral edema
- Pulse: BP:

CVS -

RS -

P/A -

CNS -

INVESTIGATIONS

- FASTING PLASMA GLUCOSE
- POST PRANDIAL PLASMA GLUCOSE
- URINE ROUTINE EXAMINATION
- URINE CULTURE AND SENSITIVITY
- ULTRASONOGRAM – ABDOMEN & PELVIS

INFORMED CONSENT

ASYMPTOMATIC BACTERIURIA IN WOMEN WITH TYPE 2 DIABETES MELLITUS

AT GOVERNMENT STANLEY HOSPITAL, CHENNAI.

Place of study: Govt. Stanley medical college, Chennai

I ……. have been informed about the details of the study in my own language.

I have completely understood the details of the study.

I am aware of the possible risks and benefits, while taking part in the study.

I agree to collect samples of blood/saliva/urine/tissue if study needs.

I understand that I can withdraw from the study at any point of time and even then, I can receive the medical treatment as usual.

I understand that I will not get any money for taking part in the study.

I will not object if the results of this study are getting published in any medical journal, provided my personal identity is not revealed.

I know what I am supposed to do by taking part in this study and I assure that I would extend my full cooperation for this study.

Volunteer:

Name and address

Signature/thumb impression:

impression

Date:

Witness:

Name and address

Signature/thumb

Date:

Investigator Signature and date

INFORMED CONSENT

ASYMPTOMATIC BACTERIURIA IN WOMEN WITH TYPE 2

DIABETES MELLITUS

AT GOVERNMENT STANLEY HOSPITAL, CHENNAI.

நான் இந்த ஆராய்ச்சியில் வரங்களை முற்றிலும் புரிந்து கொண்டேன்.

ஆய்வில் பங்கு எடுத்து போது, சாத்தியமான அபாயங்கள் மற்றும் பயன்களை பற்றி நான் அறிந்துள்ளேன்.

நான் எந்தவொரு வேளையிலும் ஆய்வில் இருந்து திரும்ப முடியும், அதன் பின்னர், நான் வழக்கம் போல் மருத்துவ சிகிச்சை பெறை முடியும் என்று புரிந்து கொள்கிறேன்

நான் ஆய்வில் பங்கு எடுத்து பணம் எதையும் பெற முடியாது என்று அறிந்துள்ளேன்.

இந்த ஆய்வின் முடிவுகள் எந்த மருத்துவ ஜர்னலில் வெளியிடப்பட இருந்தால் நான் எதிர்க்கவில்லை, என் தனிப்பட்ட அடையாளத்த வெளிப்படுத்தப்பட்டு இருக்க கூடாது.

நான் இந்த ஆய்வில் பங்கெடுப்பதன் மூலம் நான் என்ன செய்ய போகிறேன் என்று தெரியும்

நான் இந்த ஆய்வில் என் முழு ஒத்துழைப்பையும் கொடுப்பேன் என்று உறுதியளிக்கிறேன்.

தன்னா ர்வளர்

பயெர் மற்றும் மு கவரி

க யைொப்பம் / வி ரல் ரகே ை
ரகே ை

சாட்சி

பயெர் மற்றும் மு கவரி

க யைொப்பம் / வி ரல்

ஆராய்ச்சி யா ளராக

க யைொப்பம் மற்றும் தேதி

INFORMATION SHEET

TITLE: **ASYMPTOMATIC BACTERIURIA IN WOMEN WITH TYPE 2 DIABETES MELLITUS**

Name of Investigator: Name of Participant:

Purpose of Research: The purpose of the study is to find the association of asymptomatic bacteriuria with type 2 diabetes mellitus in women and to describe the causative organisms of asymptomatic bacteriuria in diabetic and non diabetic women and to determine the antibiotic susceptibility of the isolated organisms.

Study Design: Case-Control Study

Study Procedures: Detailed history will be documented. Patient will be subjected to routine clinical examination. Blood will be withdrawn to measure fasting and post-prandial plasma glucose. Clean catch, midstream urine sample will be collected. Routine analysis and culture & sensitivity will be performed on the urine sample. A screening ultrasonogram of the abdomen and pelvis will be done. Results will be evaluated and appropriate treatment given.

Possible Risks: No risks to the patient

Possible benefits

To patient: Asymptomatic patients with bacteriuria are screened and treated. Treatment is given or altered after proven efficacy in case of resistant infections.

To doctor & to other people: If the study confirms increased prevalence of asymptomatic bacteriuria in women with type 2 diabetes mellitus, then asymptomatic bacteriuria can be considered as an early complication of diabetes mellitus. It will lead to early treatment of asymptomatic bacteriuria and prevention of progression of asymptomatic bacteriuria to complicated urinary tract infection.

Confidentiality of the information obtained from you: The privacy of the patients in the research will be maintained throughout the study. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared

Can you decide to stop participating in the study: Taking part in this study is voluntary. You are free to decide whether to participate in this study or to withdraw at any time.

How will your decision to not participate in the study affect you: Your decision will not result in any loss of benefits, to which you are otherwise entitled.

Signature of Investigator Signature of Participant

Date :

Place :

INSTITUTIONAL ETHICAL COMMITTEE, STANLEY MEDICAL COLLEGE, CHENNAI-1

Title of the Work : Asymptomatic Bacteriuria in women with Type 2 Diabetes Mellitus

Principal Investigator : Dr.P. Santhosh Chakravarthy

Designation : PG in M D (General Medicine)

Department : Department of General Medicine
Government Stanley Medical College,
Chennai-01

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 25.03.2015 at the Council Hall, Stanley Medical College, Chennai-1 at 2PM

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The Principal investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of changes in study procedure, site investigator investigation or guide or any other changes.
2. You should not deviate from the area of the work for which you applied for ethical clearance.
3. You should inform the IEC immediately, in case of any adverse events or serious adverse reaction.
4. You should abide to the rules and regulation of the institution(s).
5. You should complete the work within the specified period and if any extension of time is required, you should apply for permission again and do the work.
6. You should submit the summary of the work to the ethical committee on completion of the work.

MEMBER SECRETARY,
IEC, SMC, CHENNAI

MEMBER SECRETARY
ETHICAL COMMITTEE,
STANLEY MEDICAL COLLEGE
CHENNAI-600 001.